

**POWER BENEFITS AND REVENUES FOREGONE
DUE TO WATER SUPPLY WITHDRAWALS
CUMBERLAND BASIN PROJECTS**

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ABSTRACT

The purpose of this report is to calculate the power benefits foregone, revenues foregone, and credit to Southeastern Power Administration (SEPA) due to proposed water supply withdrawals of 1.0 MGD and 10.0 MGD from each project in the Cumberland River Basin of Kentucky and Tennessee. This report also determine unit value (in dollars per MGD) for power benefits foregone, revenues foregone, and credit to SEPA for these projects.

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CHAPTER 1: INTRODUCTION

1.01 PURPOSE AND SCOPE

This report assesses the impact upon hydropower generation, which would be caused by water supply withdrawals from nine Corps of Engineers projects within the Cumberland River Basin in the states of Kentucky and Tennessee. The analysis includes the computation of the following values:

- power benefits foregone
- revenues foregone
- credit to the Federal Power Marketing Agency (Southeastern Power Administration)

Values were computed for each of these parameters for a potential 1.0 MGD withdrawal and a potential 10.0 MGD withdrawal from each project.

The data presented in this report for each project are all based upon the impact at that specific project, and do not incorporate potential impacts at downstream projects. It is recognized that the withdrawals at upstream projects may also have power impacts at downstream projects. These impacts will vary depending upon the amount of return flow that occurs below the project where the withdrawal is made. Due to these variations in return flow that may occur, and in an effort to make the information provided in this report applicable to more than one withdrawal request, it was intended that the impacts at downstream projects would be computed by Nashville District as specific reallocation requests are made, based on the information presented in this report.

Since applications for withdrawal amounts from the different cities and utilities may vary, a useful yardstick of measurement is the unit value of benefits and revenues foregone for each MGD withdrawn from the reservoir. These figures were computed in this report, and include all power benefits and revenues foregone due to losses allocable to the reservoir from which the withdrawal was made.

1.02 PROJECT DESCRIPTIONS

a. Introduction. The following paragraphs include brief descriptions of the projects examined in this study.

b. Laurel Project. Laurel Dam is a storage project located in Kentucky on the Laurel River, which is a tributary to the Cumberland River. This project is the furthest upstream project in the system, and it has a reservoir conservation storage capacity of 185,000 acre feet. It is operated for power generation and recreation. The powerplant consists of one 61 MW unit, and the average annual energy produced at the project is 67,000 MWh.

c. Wolf Creek Project. Wolf Creek Dam, which is the next project downstream of the Laurel project, is a storage project located in Kentucky on the main stem of the Cumberland River. It has a total reservoir conservation storage of 2,142,000 acre feet. It is operated for flood control, power, and recreation. The powerplant has six units with a total capacity of 270 MW and an average annual energy production of 934,000 MWh.

d. Cordell Hull Project. Cordell Hull Dam, which is downstream of the Laurel and Wolf Creek projects, is a run-of-river project located in Tennessee on the main stem of the Cumberland River. It has a total reservoir conservation storage of 54,300 acre feet. The primary purposes of this project are navigation, power, and recreation. The powerplant consists of 3 units with a total capacity of 100 MW and an average annual energy production of 401,000 MWh.

e. Old Hickory Project. Old Hickory Dam is located in Tennessee on the Cumberland River downstream of Cordell Hull and upstream of Cheatham project. It is operated as a run-of-river project, and the primary purposes of the project are navigation, power, and recreation. It has a total reservoir conservation storage of 63,000 acre feet. The powerplant has 4 units with a total capacity of 100 MW and average annual energy production of 533,000 MWh.

f. Cheatham Project. Cheatham Dam is located in Tennessee on the main stem of the Cumberland River between Old Hickory and Barkley projects. It is a run-of-river project that is operated for navigation, power, and recreation. It has a total reservoir conservation storage of 19,800 acre feet. The powerplant has three units with a total capacity of 36 MW and an average annual energy of 182,000 MWh.

g. Barkley Project. Barkley is located in Kentucky on the main stem of the Cumberland River, and is the farthest downstream project on the river. It is a run-of-river project, but it has 259,000 acre feet of storage and is operated for flood control, navigation, power, and recreation. The powerplant has 4 units with a total capacity of 130 MW and average annual energy production of 736,000 MWh.

h. Dale Hollow Project. Dale Hollow Dam is located in Tennessee on the Obey River, which is a tributary to the Cumberland River. It is a storage project with 496,000 acre feet of conservation storage and is operated for flood control, power, recreation, and fish and wildlife.

The powerplant has 3 units with a total capacity of 54 MW and produced an average annual energy of 131,000 MWh.

i. Center Hill Project. Center Hill Dam is located in Tennessee on the Caney Fork River, which is a tributary to the Cumberland River. It is a storage project with 492,000 acre feet of conservation storage and is operated for flood control, power, recreation, and fish and wildlife. The powerplant has 3 units with a total capacity a total capacity of 135 MW and produced an average annual energy of 388,000 MWh.

j. J. Percy Priest Project. J. Percy Priest Dam is located in Tennessee on the Stones River, which is a tributary to the Cumberland River. It is a storage project with 34,000 acre feet of conservation storage and is operated for flood control, power, recreation, and fish and wildlife. The powerplant has one 28 MW unit and produces an average annual energy of 78,000 MWh.

1.03 STUDY COORDINATORS

This study was prepared by the Power Branch of Water Management Division, Northwestern Division, Corps of Engineers, for Nashville District. Points of contact in Northwestern Division are Jim Barton (telephone: (503) 808-3974), and Dinh Quan (telephone: (503) 808-3979), at Post Office Box 2870, Portland, Oregon 97208, ATTN: CENWD-NP-ET-WP (Power). The study manager for Nashville District is Bill Barron at (telephone: (615) 736-2023).

1.04 THE COST OF WATER SUPPLY

The water supply withdrawals addressed in this study are relatively small and thus qualify for analysis under the procedures outlined in Section 4-32d of ER 1105-2-100, the *Planning Guidance Notebook* (28 December 1990). These procedures require that the cost to the water supply customer be the highest of the following:

- the updated cost of storage in the Federal project
- benefits foregone
- revenues foregone
- replacement cost of power

For the projects under consideration, the storage reallocation will be evaluated from hydropower to water supply, so the benefits foregone will be power benefits. The revenues foregone and the

replacement cost of power are also power-related. The following paragraphs briefly describe each of these power-related values.

1.05 POWER BENEFITS FOREGONE

Hydropower benefits are based on the cost of the most likely alternative source of power. When power storage is reallocated to water supply, the power benefits foregone are equivalent to the cost of replacing the lost power with the most likely alternative source of power.

The power benefits foregone can be divided into two components: The lost energy benefits and the lost capacity benefits. In the case of water supply withdrawals, there is usually a loss of energy benefits, and the lost energy benefits are the result of water being diverted from the reservoir for water supply rather than passing through the hydro plant.

In addition, there could be a loss of capacity benefits as a result of a loss in dependable capacity at the project. Dependable capacity could be lost as a result of:

- a loss in head due to lower post-withdrawal reservoir elevations.
- a reduction in the usability of the capacity due to inadequate energy to support the full capacity during low-flow periods.

The details of energy benefit computation are described in Chapter 3, and the capacity benefit computations are shown in Chapter 4.

1.06 REVENUES FOREGONE

The second power-related cost is the revenues foregone. This is the value of the lost power based on the power marketing agency's current rates. The calculations supporting this study's figures for revenues foregone are contained in Chapter 6.

1.07 REPLACEMENT COST OF POWER

The third power-related cost is the cost of replacement power. This is an economic or National Economic Development (NED) cost, and is therefore a redundant value in the case of hydropower. This is because the NED power benefits foregone are based on the cost of the most likely alternative, which in fact is the cost of replacement power. Replacement cost is included in the guidance as one of the four alternatives to be evaluated because it has meaning when storage

is reallocated from functions other than hydropower. For example, if the objective is to reallocate flood control storage to water supply, the replacement cost of flood control storage would have to be considered, because this storage would have an entirely different value than the flood control benefits foregone. However, for a hydropower storage reallocation, the replacement cost of hydropower is identical to the power benefits foregone.

Note that Section 4-32d(3) of the *Planning Guidance Notebook* also discusses a replacement cost based on financial or actual market prices, but this is an entirely different value than the replacement cost discussed in the paragraph above. The market-based replacement cost is to be used to compute a possible credit to be given to the power marketing agency (in this case Southeastern Power Administration). If the water supply reallocation results in less hydropower being available to the marketing agency for delivery to its customers, the marketing agency will receive a credit to offset additional costs that they might incur and to reduce their repayment obligation. The calculation of this value for each project is shown in Chapter 7.

CHAPTER 2: POWER BENEFITS

2.01 GENERAL

The details of energy and capacity benefit computation are described in Chapters 3 and 4, respectively. This chapter describes some of the terminology and basic assumptions required for computing the benefits.

2.02 POWER VALUES

The power benefits foregone are computed by applying power values to the loss in average annual generation and dependable capacity at the projects. The capacity value, which is applied to the dependable capacity loss, represents the unit cost of constructing an increment of thermal generation to replace the capacity. The energy value, which represents the unit cost of producing replacement energy in the area power system, is applied to the loss in average annual generation.

These values were derived using NED economic criteria, in accordance with the US Water Resources Council's *Economics and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (hereafter referred to as the *Principles and Guidelines*). Specific project-related power values were computed for each of the nine projects.

2.03 INTEREST RATE

The interest rate used in computing power benefits foregone due to the water supply reallocation is the current (Fiscal Year 1999) Federal interest rate of 6-7/8 percent.

2.04 PERIOD OF ANALYSIS

The benefits foregone are being computed for withdrawal contracts to be implemented during 2000. Guidance from the Office of the Chief of Engineers (OCE) indicates that the period of analysis for storage reallocations should be the greater of (a) the remaining economic life of the project, or (b) 50 years. The power on-line date, total economic life, and remaining economic life for the nine projects are shown in Table 2-1.

Four different load years (or "study years") were examined during the computation of energy benefits foregone: Current (2000) conditions and projected conditions for the years 2005, 2010 and 2015. The projected conditions reflect both projected water supply withdrawals and projected power system conditions, including projected real fuel prices. Values for intermediate years between 2000, 2005, and 2010 were estimated by exponential interpolation, and the 2015 level values were assumed to be representative of the remaining years of analysis beyond 2015.

TABLE 2-1
PERTINENT PROJECT
HYDROPOWER AND ECONOMIC PARAMETER

Power Generation Parameters	<u>Laurel</u>	<u>Wolf Creek</u>	<u>Cordell Hull</u>	<u>Old Hickory</u>	<u>Cheatham</u>	<u>Barkley</u>	<u>Dale Hollow</u>	<u>Center Hill</u>	<u>J.P. Priest</u>
Installed capacity (MW)	61	270	100	100	36	130	54	135	28
Average head (ft)	251	156	50	50	23	42	133	157	89
Average efficiency (%)	92	89	90	91	85	91	87	89	86
Economic Parameters									
Power on-line (POL) date	1977	1952	1974	1957	1958	1966	1949	1951	1970
Total Project life (yrs)	100	100	100	100	100	100	100	100	100
Remaining life (yrs)	77	52	74	57	58	66	49	51	70

2.05 PRICE LEVEL

The power benefits foregone are based on 1 October 1998 price levels.

2.06 MOST LIKELY ALTERNATIVE

As described in Section 4.05, the most likely thermal alternative to replace generation losses at these projects due to water supply withdrawals is assumed to be a mix of (47%) gas-fired combustion turbine and (53%) gas-fired combined cycle.

CHAPTER 3: ENERGY BENEFITS FOREGONE

3.01 GENERAL

Energy benefits foregone has been traditionally computed as the product of the energy loss (in kilowatt-hours) and a unit energy value (in mills/kWh), which is based on the cost of energy from the alternative thermal plant that would replace the lost energy. Manual adjustments are made to account for system effects.

More recently, the loss of energy benefits has been calculated directly using a system production cost model, rather than using unit energy values. The latter approach better accounts for the manner in which hydropower is used in the particular power system being considered, and thus it provides a more accurate measure of the energy benefits foregone.

The output from the POWRSYM system production cost model was used in this study to compute the value of lost energy. The resulting energy benefit losses were converted into unit energy values so that they can be applied to any proposed withdrawal at any of the nine projects included in the study.

The basic procedure for estimating these unit energy values is as follows:

- obtain historical generation data for the projects from SEPA
- determine total weekly generation from the daily historical generation data for the base condition without water supply withdrawals
- estimate the million gallon per day (MGD) water supply withdrawals
- convert these withdrawals to kilowatt-hour (kWh) energy losses
- adjust hourly marginal cost data from the TVA POWRSYM model for selected years consisting of 2000, 2005, 2010 and 2015 to remove inflation
- using adjusted marginal cost data, develop tables to determine the exceedance percentage for the respective marginal cost data after it is aggregated for each week
- using marginal cost data from the previous step, develop weekly curves of marginal costs versus exceedance percentage for each week
- for each week of the historical daily generation data from SEPA for the period from 1987 through 1997, determine the energy benefit by looking up the average deflated marginal cost associated with the hours of generation in a particular week (from

- previous step) and multiplying it by the amount of weekly generation that occurred (from step 2)
- sum the weekly energy benefit values to determine annual energy benefits for each year in the historical period
 - average the annual energy benefits from the previous step to determine the overall average annual energy benefits for all years
 - repeat the previous 3 steps for the case where energy generation is reduced due to water supply withdrawals
 - determine the energy benefits foregone by taking the difference in the energy benefits with and without the water supply withdrawal

This process was repeated for each of the four load years, and the average annual value of energy was computed by using present-worthing techniques.

3.02 WATER SUPPLY WITHDRAWALS

Two level of water supply withdrawals were used to develop unit values for power benefits foregone: 1.0 MGD and 10.0 MGD from all projects. The seasonal distribution of 1.0 MGD withdrawals from the projects are shown in Table 3-1, and 10.0 MGD withdrawals are shown in Table 3-2.

The data presented in this report for each project are all based upon the impact at that specific project, and do not incorporate potential impacts at downstream projects. It is recognized that the withdrawals at upstream projects may also have power impacts at downstream projects. These impacts will vary depending upon the amount of return flow that occurs below the project where the withdrawal is made. Due to these variations in return flow that may occur, and in a effort to make the information provided in this report applicable to more than one withdrawal request, it was intended that the impacts at downstream projects would be computed by Nashville District as specific reallocation requests are made, based on the information presented in this report.

The range of estimated water withdrawals from the projects, were developed by Nashville District. These water supply withdrawals are for fixed levels, so the same withdrawal rates were assumed for all study years (2000, 2005, 2010, and 2015).

Tables 3-1 through 3-2 also show the average withdrawal rates over the peak power demand period, June through August. These values are required for the dependable capacity computations described in Section 4.02.

TABLE 3-1
AVERAGE 1.0 MGD MONTHLY NET WATER SUPPLY WITHDRAWALS
WITH NO RETURN FLOW

<u>Month</u>	<u>Laurel</u>	<u>Wolf Creek</u>	<u>Cordell Hull</u>	<u>Old Hickory</u>	<u>Cheatham</u>	<u>Barkley</u>	<u>Dale Hollow</u>	<u>Center Hill</u>	<u>J. P. Priest</u>
January	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
February	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
March	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
April	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
May	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
June	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
July	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
August	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
September	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
October	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
November	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
December	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Annual 12-month Avg.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TABLE 3-2
AVERAGE 10.0 MGD MONTHLY NET WATER SUPPLY WITHDRAWALS
WITH NO RETURN FLOW

<u>Month</u>	<u>Laurel</u>	<u>Wolf Creek</u>	<u>Cordell Hull</u>	<u>Old Hickory</u>	<u>Cheatham</u>	<u>Barkley</u>	<u>Dale Hollow</u>	<u>Center Hill</u>	<u>J. P. Priest</u>
January	10.34	10.34	10.34	10.34	10.34	10.34	10.34	10.34	10.34
February	10.17	10.17	10.17	10.17	10.17	10.17	10.17	10.17	10.17
March	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54	9.54
April	7.87	7.87	7.87	7.87	7.87	7.87	7.87	7.87	7.87
May	10.34	10.34	10.34	10.34	10.34	10.34	10.34	10.34	10.34
June	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86
July	11.49	11.49	11.49	11.49	11.49	11.49	11.49	11.49	11.49
August	11.21	11.21	11.21	11.21	11.21	11.21	11.21	11.21	11.21
September	10.29	10.29	10.29	10.29	10.29	10.29	10.29	10.29	10.29
October	10.29	10.29	10.29	10.29	10.29	10.29	10.29	10.29	10.29
November	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08
December	8.74	8.74	8.74	8.74	8.74	8.74	8.74	8.74	8.74
Annual 12-month Avg.	10.02	10.02	10.02	10.02	10.02	10.02	10.02	10.02	10.02

NOTE: Monthly withdrawal rates were based on 1995 monthly withdrawal for the city of Smyrna. The percentage of annual flow by month, was calculated by dividing monthly withdrawal amount by the annual withdrawal amount.

3.03 ENERGY LOSSES

- a. General.** Using the head and efficiency parameters shown in Table 2-1 and the net streamflow reductions from Tables 3-1 to 3-2, the weekly average energy loss at each project was calculated using the water power equation;

$$\text{lost energy (kWh)} = \frac{1.547Qhet}{11.81}$$

where: 1.547 = CFS per MGD
Q = weekly withdrawal rate in MGD
h = average generating head in feet
e = average unit efficiency
t = hours in one week (168)

- b. Losses Caused by 1.0 MGD Withdrawals.** The 1.0 MGD average annual withdrawal will resulted in: A 266 MWh annual loss at Laurel, a 159 MWh annual loss at Wolf Creek, a 52 MWh annual loss at Cordell Hull, a 53 MWh annual loss at Old Hickory, a 22 MWh annual loss at Cheatham, a 43 MWh annual loss at Barkley, a 133 MWh annual loss at Dale Hollow, a 160 MWh annual loss at Center Hill and a 88 MWh annual loss at J. P. Priest.
- c. Losses Caused by 10.0 MGD Withdrawals.** The 10.0 MGD average annual withdrawal will resulted in: A 2,665 MWh annual loss at Laurel, a 1,592 MWh annual loss at Wolf Creek, a 519 MWh annual loss at Cordell Hull, a 528 MWh annual loss at Old Hickory, a 224 MWh annual loss at Cheatham, a 432 MWh annual loss at Barkley, a 1,326 MWh annual loss at Dale Hollow, a 1,602 MWh annual loss at Center Hill and a 884 MWh annual loss at J. P. Priest.

TABLE 3-3
ENERGY LOSSES FOR 1.0 MGD WITHDRAWAL

Average Hydro Energy Foregone (MWh)

Month	<u>Laurel</u>	<u>Wolf Creek</u>	<u>Cordell Hull</u>	<u>Old Hickory</u>	<u>Cheatham</u>	<u>Barkley</u>	<u>Dale Hollow</u>	<u>Center Hill</u>	<u>J.P. Priest</u>
Average MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD
January	23.3	13.9	4.5	4.6	2.0	3.8	11.6	14.0	7.7
February	20.9	12.5	4.1	4.1	1.8	3.4	10.4	12.5	6.9
March	21.5	12.8	4.2	4.3	1.8	3.5	10.7	12.9	7.1
April	17.3	10.3	3.4	3.4	1.5	2.8	8.6	10.4	5.7
May	23.3	13.9	4.5	4.6	2.0	3.8	11.6	14.0	7.7
June	23.9	14.3	4.7	4.7	2.0	3.9	11.9	14.4	7.9
July	26.0	15.6	5.1	5.2	2.2	4.2	13.0	15.6	8.6
August	25.4	15.1	4.9	5.0	2.1	4.1	12.6	15.2	8.4
September	22.6	13.5	4.4	4.5	1.9	3.7	11.2	13.6	7.5
October	23.3	13.9	4.5	4.6	2.0	3.8	11.6	14.0	7.7
November	19.9	11.9	3.9	3.9	1.7	3.2	9.9	12.0	6.6
December	19.1	11.4	3.7	3.8	1.6	3.1	9.5	11.5	6.3
ANNUAL	266.4	159.2	51.9	52.7	22.4	43.2	132.6	160.1	88.4
DAILY AVE	0.73	0.44	0.14	0.14	0.06	0.12	0.36	0.44	0.24

TABLE 3-4
ENERGY LOSSES FOR 10.0 MGD WITHDRAWAL

Average Hydro Energy Foregone (MWh)

Month	<u>Laurel</u>	<u>Wolf Creek</u>	<u>Cordell Hull</u>	<u>Old Hickory</u>	<u>Cheatham</u>	<u>Barkley</u>	<u>Dale Hollow</u>	<u>Center Hill</u>	<u>J.P. Priest</u>
Average MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD
January	234.1	139.8	45.6	46.3	19.7	38.0	116.4	140.7	77.7
February	207.9	124.2	40.5	41.2	17.5	33.7	103.5	125.0	69.0
March	215.9	129.0	42.1	42.7	18.1	35.0	107.4	129.8	71.7
April	172.4	103.0	33.6	34.1	14.5	28.0	85.8	103.6	57.2
May	234.1	139.8	45.6	46.3	19.7	38.0	116.4	140.7	77.7
June	237.9	142.1	46.3	47.1	20.0	38.6	118.4	143.0	78.9
July	260.1	155.4	50.7	51.5	21.8	42.2	129.4	156.3	86.3
August	253.7	151.6	49.4	50.2	21.3	41.1	126.2	152.5	84.2
September	225.4	134.7	43.9	44.6	18.9	36.6	112.1	135.5	74.8
October	232.9	139.1	45.4	46.1	19.6	37.8	115.9	140.0	77.3
November	198.9	118.8	38.7	39.4	16.7	32.3	99.0	119.6	66.0
December	191.5	114.4	37.3	37.9	16.1	31.0	95.3	115.1	63.5
ANNUAL	2664.7	1592.0	519.1	527.5	223.8	432.1	1325.8	1601.7	884.2
DAILY AVE	7.32	4.37	1.43	1.45	0.61	1.19	3.64	4.40	2.43

3.04 ENERGY BENEFITS FOREGONE

The energy benefits foregone were determined by subtracting the energy benefits resulting in the alternatives with water supply withdrawals from those resulting in the base condition without the water supply withdrawal. The results of this analysis are shown below in Tables 3-5 and 3-6.

**Table 3-5 - Levelized Energy Benefits
1.0 MGD Withdrawal, No Growth Rate**

INTEREST RATE 0.06875		LAUREL PW		WOLF CREEK PW		CORDELL HULL PW		OLD HICKORY PW		CHEATHAM PW		BARKLEY PW		DALE HOLLOW PW		CENTER HILL PW		JP PRIEST PW	
NO.	YR.	PRESENT WORTH FACTOR	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	
	2000	1.0000	8,484		4,488		1,445		1,418		591		1,140		3,869		4,586		2,333
1	2001	0.9357	8,713	8153	4,618	4321	1,487	1391	1,453	1360	607	568	1,167	1092	3,985	3729	4,723	4419	2,389 2235
2	2002	0.8755	8,942	7828	4,748	4157	1,529	1339	1,489	1303	623	545	1,195	1046	4,101	3591	4,860	4255	2,445 2141
3	2003	0.8192	9,170	7512	4,878	3996	1,571	1287	1,524	1249	639	523	1,222	1001	4,218	3455	4,996	4093	2,501 2049
4	2004	0.7665	9,399	7204	5,008	3839	1,613	1236	1,560	1195	655	502	1,250	958	4,334	3322	5,133	3935	2,557 1960
5	2005	0.7172	9,628	6905	5,138	3685	1,655	1187	1,595	1144	671	481	1,277	916	4,450	3192	5,270	3780	2,613 1874
6	2006	0.6710	10,464	7021	5,974	4008	2,491	1671	2,431	1631	1,507	1011	2,113	1418	5,286	3547	6,106	4097	3,449 2314
7	2007	0.6279	11,299	7095	6,809	4275	3,326	2089	3,266	2051	2,342	1471	2,948	1851	6,121	3844	6,941	4358	4,284 2690
8	2008	0.5875	12,135	7129	7,645	4491	4,162	2445	4,102	2410	3,178	1867	3,784	2223	6,957	4087	7,777	4569	5,120 3008
9	2009	0.5497	12,970	7130	8,480	4662	4,997	2747	4,937	2714	4,013	2206	4,619	2539	7,792	4283	8,612	4734	5,955 3274
10	2010	0.5143	13,806	7100	7,010	3605	2,247	1156	2,141	1101	877	451	1,685	867	6,183	3180	7,061	3631	3,448 1773
11	2011	0.4812	14,222	6844	7,253	3490	2,321	1117	2,010	967	894	430	1,736	835	6,343	3052	7,316	3521	3,553 1710
12	2012	0.4503	14,638	6591	7,497	3376	2,396	1079	1,878	846	911	410	1,787	805	6,504	2929	7,572	3410	3,657 1647
13	2013	0.4213	15,053	6342	7,740	3261	2,470	1041	1,747	736	929	391	1,839	775	6,664	2808	7,827	3298	3,762 1585
14	2014	0.3942	15,469	6098	7,984	3147	2,545	1003	1,615	637	946	373	1,890	745	6,825	2690	8,083	3186	3,866 1524
15	2015	0.3689	15,885	5860	8,227	3035	2,619	966	1,484	547	963	355	1,941	716	6,985	2577	8,338	3076	3,971 1465
16	2016	0.3451	15,885	5482	8,227	2839	2,619	904	1,484	512	963	332	1,941	670	6,985	2411	8,338	2877	3,971 1370
17	2017	0.3229	15,885	5129	8,227	2656	2,619	846	1,484	479	963	311	1,941	627	6,985	2255	8,338	2692	3,971 1282
18	2018	0.3022	15,885	4800	8,227	2486	2,619	791	1,484	448	963	291	1,941	587	6,985	2111	8,338	2520	3,971 1200
19	2019	0.2827	15,885	4491	8,227	2326	2,619	740	1,484	420	963	272	1,941	549	6,985	1975	8,338	2357	3,971 1123
20	2020	0.2645	15,885	4202	8,227	2176	2,619	693	1,484	393	963	255	1,941	513	6,985	1848	8,338	2205	3,971 1050
21	2021	0.2475	15,885	3932	8,227	2036	2,619	648	1,484	367	963	238	1,941	480	6,985	1729	8,338	2064	3,971 983
22	2022	0.2316	15,885	3679	8,227	1905	2,619	607	1,484	344	963	223	1,941	450	6,985	1618	8,338	1931	3,971 920
23	2023	0.2167	15,885	3442	8,227	1783	2,619	568	1,484	322	963	209	1,941	421	6,985	1514	8,338	1807	3,971 861
24	2024	0.2028	15,885	3221	8,227	1668	2,619	531	1,484	301	963	195	1,941	394	6,985	1417	8,338	1691	3,971 805
25	2025	0.1897	15,885	3013	8,227	1561	2,619	497	1,484	282	963	183	1,941	368	6,985	1325	8,338	1582	3,971 753
26	2026	0.1775	15,885	2820	8,227	1460	2,619	465	1,484	263	963	171	1,941	345	6,985	1240	8,338	1480	3,971 705
27	2027	0.1661	15,885	2638	8,227	1367	2,619	435	1,484	246	963	160	1,941	322	6,985	1160	8,338	1385	3,971 660
28	2028	0.1554	15,885	2469	8,227	1278	2,619	407	1,484	231	963	150	1,941	302	6,985	1085	8,338	1296	3,971 617
29	2029	0.1454	15,885	2310	8,227	1196	2,619	381	1,484	216	963	140	1,941	282	6,985	1016	8,338	1212	3,971 577
30	2030	0.1361	15,885	2162	8,227	1120	2,619	356	1,484	202	963	131	1,941	264	6,985	951	8,338	1135	3,971 540
31	2031	0.1273	15,885	2022	8,227	1047	2,619	333	1,484	189	963	123	1,941	247	6,985	889	8,338	1061	3,971 506
32	2032	0.1191	15,885	1892	8,227	980	2,619	312	1,484	177	963	115	1,941	231	6,985	832	8,338	993	3,971 473
33	2033	0.1115	15,885	1771	8,227	917	2,619	292	1,484	165	963	107	1,941	216	6,985	779	8,338	930	3,971 443
34	2034	0.1043	15,885	1657	8,227	858	2,619	273	1,484	155	963	100	1,941	202	6,985	729	8,338	870	3,971 414
35	2035	0.0976	15,885	1550	8,227	803	2,619	256	1,484	145	963	94	1,941	189	6,985	682	8,338	814	3,971 388
TOTAL			167,495		89,813		32,088		25,747		15,386		25,446		77,847		91,262		46,918
ANALYSIS PERIOD			35		35		35		35		35		35		35		35		35
LEVELIZED ENERGY BENEFIT			12,760		6,842		2,445		1,961		11,72		1,939		5,931		6,953		3,574

**Table 3-6 - Levelized Energy Benefits
10.0 MGD Withdrawal, No Growth Rate**

INTEREST RATE 0.06875		LAUREL PW		WOLF CREEK PW		CORDELL HULL PW		OLD HICKORY PW		CHEATHAM PW		BARKLEY PW		DALE HOLLOW PW		CENTER HILL PW		JP PRIEST PW		
NO.	YR.	PRESENT WORTH FACTOR	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$	ENG BEN \$		
	2000	1.0000	85,820		44,876		14,434		14,176		5,907		11,401		38,436		45,911		23,327	
1	2001	0.9357	88,131	82464	46,180	43210	14,864	13908	14,531	13597	6,064	5674	11,675	10924	39,582	37037	47,282	44242	23,888 22352	
2	2002	0.8755	90,442	79182	47,484	41572	15,294	13390	14,886	13033	6,221	5446	11,949	10462	40,728	35658	48,654	42596	24,449 21405	
3	2003	0.8192	92,752	75983	48,787	39967	15,724	12881	15,242	12486	6,378	5225	12,224	10014	41,875	34304	50,025	40981	25,010 20488	
4	2004	0.7665	95,063	72866	50,091	38395	16,154	12382	15,597	11955	6,535	5009	12,498	9580	43,021	32975	51,397	39395	25,571 19600	
5	2005	0.7172	97,374	69837	51,395	36860	16,584	11894	15,952	11441	6,692	4800	12,772	9160	44,167	31677	52,768	37845	26,132 18742	
6	2006	0.6710	105,604	70860	55,164	37015	17,738	11902	17,046	11438	7,094	4760	13,590	9119	47,636	31964	56,350	37811	27,806 18658	
7	2007	0.6279	113,834	71477	58,933	37004	18,892	11862	18,141	11391	7,496	4707	14,408	9047	51,106	32089	59,932	37631	29,480 18510	
8	2008	0.5875	122,065	71713	62,701	36837	20,045	11777	19,235	11301	7,898	4640	15,226	8945	54,575	32063	63,513	37314	31,153 18303	
9	2009	0.5497	130,295	71623	66,470	36539	21,199	11653	20,330	11175	8,300	4563	16,044	8819	58,045	31907	67,095	36882	32,827 18045	
10	2010	0.5143	138,525	71243	70,239	36124	22,353	11496	21,424	11018	8,702	4475	16,862	8672	61,514	31637	70,677	36349	34,501 17744	
11	2011	0.4812	142,952	68788	72,709	34988	23,110	11121	22,109	10639	8,889	4277	17,374	8360	63,072	30350	73,219	35233	35,549 17106	
12	2012	0.4503	147,379	66365	75,179	33853	23,867	10747	22,793	10264	9,076	4087	17,886	8054	64,630	29103	75,761	34115	36,596 16479	
13	2013	0.4213	151,805	63956	77,649	32714	24,624	10374	23,478	9891	9,264	3903	18,398	7751	66,188	27885	78,303	32989	37,644 15859	
14	2014	0.3942	156,232	61587	80,119	31583	25,381	10005	24,162	9525	9,451	3726	18,910	7454	67,746	26705	80,845	31869	38,691 15252	
15	2015	0.3689	160,659	59267	82,589	30467	26,138	9642	24,847	9166	9,638	3555	19,422	7165	69,304	25566	83,387	30761	39,739 14660	
16	2016	0.3451	160,659	55443	82,589	28501	26,138	9020	24,847	8575	9,638	3326	19,422	6703	69,304	23917	83,387	28777	39,739 13714	
17	2017	0.3229	160,659	51877	82,589	26668	26,138	8440	24,847	8023	9,638	3112	19,422	6271	69,304	22378	83,387	26926	39,739 12832	
18	2018	0.3022	160,659	48551	82,589	24958	26,138	7899	24,847	7509	9,638	2913	19,422	5869	69,304	20944	83,387	25200	39,739 12009	
19	2019	0.2827	160,659	45418	82,589	23348	26,138	7389	24,847	7024	9,638	2725	19,422	5491	69,304	19592	83,387	23574	39,739 11234	
20	2020	0.2645	160,659	42494	82,589	21845	26,138	6914	24,847	6572	9,638	2549	19,422	5137	69,304	18331	83,387	22056	39,739 10511	
21	2021	0.2475	160,659	39763	82,589	20441	26,138	6469	24,847	6150	9,638	2385	19,422	4807	69,304	17153	83,387	20638	39,739 9835	
22	2022	0.2316	160,659	37209	82,589	19128	26,138	6054	24,847	5755	9,638	2232	19,422	4498	69,304	16051	83,387	19312	39,739 9204	
23	2023	0.2167	160,659	34815	82,589	17897	26,138	5664	24,847	5384	9,638	2089	19,422	4209	69,304	15018	83,387	18070	39,739 8611	
24	2024	0.2028	160,659	32582	82,589	16749	26,138	5301	24,847	5039	9,638	1955	19,422	3939	69,304	14055	83,387	16911	39,739 8059	
25	2025	0.1897	160,659	30477	82,589	15667	26,138	4958	24,847	4713	9,638	1828	19,422	3684	69,304	13147	83,387	15819	39,739 7538	
26	2026	0.1775	160,659	28517	82,589	14660	26,138	4639	24,847	4410	9,638	1711	19,422	3447	69,304	12301	83,387	14801	39,739 7054	
27	2027	0.1661	160,659	26685	82,589	13718	26,138	4342	24,847	4127	9,638	1601	19,422	3226	69,304	11511	83,387	13851	39,739 6601	
28	2028	0.1554	160,659	24966	82,589	12834	26,138	4062	24,847	3861	9,638	1498	19,422	3018	69,304	10770	83,387	12958	39,739 6175	
29	2029	0.1454	160,659	23360	82,589	12008	26,138	3800	24,847	3613	9,638	1401	19,422	2824	69,304	10077	83,387	12124	39,739 5778	
30	2030	0.1361	160,659	21866	82,589	11240	26,138	3557	24,847	3382	9,638	1312	19,422	2643	69,304	9432	83,387	11349	39,739 5408	
31	2031	0.1273	160,659	20452	82,589	10514	26,138	3327	24,847	3163	9,638	1227	19,422	2472	69,304	8822	83,387	10615	39,739 5059	
32	2032	0.1191	160,659	19134	82,589	9836	26,138	3113	24,847	2959	9,638	1148	19,422	2313	69,304	8254	83,387	9931	39,739 4733	
33	2033	0.1115	160,659	17913	82,589	9209	26,138	2914	24,847	2770	9,638	1075	19,422	2166	69,304	7727	83,387	9298	39,739 4431	
34	2034	0.1043	160,659	16757	82,589	8614	26,138	2726	24,847	2592	9,638	1005	19,422	2026	69,304	7228	83,387	8697	39,739 4145	
35	2035	0.0976	160,659	15680	82,589	8061	26,138	2551	24,847	2425	9,638	941	19,422	1896	69,304	6764	83,387	8139	39,739 3879	
TOTAL				169,1170		873,023		278,175		266,365		106,879		210,166		744,394		885,060		430,013
ANALYSIS PERIOD				35		35		35		35		35		35		35		35		35
LEVELIZED ENERGY BENEFIT				128,839		66,510		21,192		20,293		8,142		16,011		56,711		67,427		32,760

CHAPTER 4: CAPACITY BENEFITS FOREGONE

4.01 GENERAL

Capacity benefits are defined as the product of the loss in dependable capacity and unit capacity values, which represent the cost of constructing replacement thermal capacity.

4.02 DEPENDABLE CAPACITY

a. General. A hydro project's dependable capacity is a measure of the amount of capacity that the project can reliably contribute towards meeting system peak power demands. If a hydro project (a) always maintains approximately the same head, and (b) there is always an adequate supply of streamflow, so that there is enough generation for the full capacity to be usable in the system load, the full installed capacity can be considered to be dependable. In some cases even the overload capacity is dependable.

However, at storage projects, normal reservoir drawdowns can result in a loss of capacity due to a loss in head. At other times, streamflows in low flow periods may result in insufficient generation to support the available capacity in the load. Dependable capacity accounts for these factors by giving a measure of the amount of capacity that can be provided with some degree of reliability, particularly during peak demand periods.

b. Selection of Method. Dependable capacity can be computed in several ways, but the method that is most appropriate for evaluating hydro in a predominantly thermal-based power system is the average availability method, as described in Section 6-7g of EM 1110-2-1701, *Hydropower*. Basically, the occasional unavailability of a portion of hydro project's generating capacity due to hydrologic variations should be treated in the same manner as the occasional unavailability of all or part of a thermal plant's generating capacity due to forced outages.

This assumption is not appropriate in power systems where hydropower is a major resource, because adverse hydrology can affect all of the hydro projects in a system simultaneously, with a resulting long-term reduction in capacity at all projects. In such systems, hydro dependable capacity must be based on the capacity available under adverse hydrologic conditions.

This is not the case in a large, diverse power system, where hydropower represents only a small portion of the region's generating resources. When defining a hydro project's contribution to meeting peak loads in this type of system, random hydrologic variations can be considered equivalent to random thermal plant forced outages. Southeastern Power Administration's power marketing area is a relatively large, diverse thermal-based power system with a relatively small amount of hydro, so the average availability method is the most appropriate method for measuring dependable capacity for the NED benefit analysis of the Cumberland projects.

c. Dependable Capacity vs. Marketable Capacity. The average availability method differs from the method used by Southeastern Power Administration (SEPA) in defining the amount of hydro capacity that it can market. SEPA uses a method based on adverse water, because hydropower is its only generating resource. It can only guarantee delivery of the hydro capacity that it can support during adverse water conditions, because it has no thermal plants to back up the hydro. It sometimes purchases thermal power on the open market during periods of low streamflows, but it cannot afford to do this very often and still meet its repayment obligations.

However, even though SEPA uses a method based on an adverse hydro year to determine the marketable capacity of the Cumberland projects, that does not mean that its method is appropriate for measuring the loss in NED capacity benefits at these projects. The objective of NED benefits is to measure the gain or loss of benefits to the nation as a whole¹, not to a single entity (such as SEPA) or to a small group of entities (SEPA's customers).

4.03 COMPUTATION OF DEPENDABLE CAPACITY

a. General. The next step was to define a procedure for applying the average availability method to Corps hydro projects in the Cumberland River system. Hydropower projects in this system may occasionally lose capacity due to loss of head or due to inadequate energy to support the available capacity. Similarly, there are periods when the full peaking capacity is both available and usable. The average availability method attempts to measure the average capacity available during the peak demand periods of the year.

b. Hydrologic Period of Analysis. In order to evaluate the average capacity for a project, a long-term record of project operation should be used. Actual project operating records can be used, but the period of operation is sometimes not long enough for some projects in this system to give a statistically reliable value. Since there was no simulation model such as HEC-5

¹ Actually, it is not practical to examine the impact of a capacity loss on the entire national power grid, but NED benefits can be approximated by analyzing the regional power system, which is what was done in this study.

available to simulate at the time of this study the operation of the projects in this system, historical data for the period from 1987 through 1997 was used in this study.

c. Criteria for Dependability of Capacity. It is also necessary to evaluate the amount of time that capacity must be sustained (supported with energy) each day for it to be usable in the system peak load.

SEPA has specified 1981 as its system critical period year. This water year was therefore used in this study as the basis for defining the energy requirements to support dependable capacity. Dependable capacity is usually related to the amount of capacity that can be supported in the peak demand period, which in this region are the summer months. For purposes of this study, the summer peak demand period was defined as June through August. The average monthly energy during this period was obtained from historical records obtained from SEPA for each of the projects for the period from 1987 through 1997.

The number of hours that each project is required to support was then determined by dividing the average weekly energy produced in June through August of 1981 by the amount of capacity that SEPA markets at each project. The computation of the required hours on peak for each of the Cumberland River projects are shown in Table 4-1.

TABLE 4-1
SUPPORTABLE CAPACITY CALCULATIONS

	<u>Laurel</u>	<u>Wolf Creek</u>	<u>Cordell Hull</u>	<u>Old Hickory</u>	<u>Cheatham</u>	<u>Barkley</u>	<u>Dale Hollow</u>	<u>Center Hill</u>	<u>J. Percy Priest</u>
Overload Capacity (MW)	70	312	114	115	41	148	62	156	30
Average weekly energy (MWh)	590	21849	9133	10105	3628	11187	2438	3416	409
SEPA marketable capacity (MW)	70	274	99	122	38	158	48	119	32
Machine capability (MW)	70	312	114	116	41	148	62	156	30
Hours on peak per week	8.43	79.74	92.25	82.83	95.47	70.80	50.79	28.71	12.78

4.04 DEPENDABLE CAPACITY

The next step in determining the dependable capacity was to apply the above criteria to the peak demand season for each year in the period of record.

Each project's peaking requirement was applied to the average weekly energy available during June through August for each year during the 1987-1997 historical period. This resulted in the capacity that could be supported in each year under existing conditions. The right-hand portion of Tables 4-2 through 4-19 show these calculations for the Laurel, Wolf Creek, Cordell Hull, Old Hickory, Cheatham, Barkley, Dale Hollow, Center Hill, and J. Percy Priest projects, respectively.

The dependable capacity is the average of all of the annual supportable capacity values over the period of record.

TABLE 4-2
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Laurel Project, 1.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Average Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	Actual Support Capacity	Average Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	
1981	8.43	589923	69991	70000	69991	584197	69311	70000	69311	679
1987	8.43	632692	75065	70000	70000	626966	74386	70000	70000	0
1988	8.43	639462	75868	70000	70000	633735	75189	70000	70000	0
1989	8.43	2129385	252639	70000	70000	2123658	251959	70000	70000	0
1990	8.43	437846	51948	70000	51948	432120	51268	70000	51268	679
1991	8.43	940769	111617	70000	70000	935043	110937	70000	70000	0
1992	8.43	974462	115614	70000	70000	968735	114935	70000	70000	0
1993	8.43	565846	67134	70000	67134	560120	66455	70000	66455	679
1994	8.43	554846	65829	70000	65829	549120	65150	70000	65150	679
1995	8.43	713385	84639	70000	70000	707658	83959	70000	70000	0
1996	8.43	788385	93537	70000	70000	782658	92858	70000	70000	0
1997	8.43	1221538	144928	70000	70000	1215812	144249	70000	70000	0
Average Actual Supportable Capacities (kW) :						67719				67534
										185

TABLE 4-3
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Laurel Project, 10.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Average Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	Actual Support Capacity	Average Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	
1981	8.43	589923	69991	70000	69991	532722	63204	70000	63204	6787
1987	8.43	632692	75065	70000	70000	575491	68279	70000	68279	1721
1988	8.43	639462	75868	70000	70000	582261	69082	70000	69082	918
1989	8.43	2129385	252639	70000	70000	2072184	245852	70000	70000	0
1990	8.43	437846	51948	70000	51948	380645	45161	70000	45161	6787
1991	8.43	940769	111617	70000	70000	883568	104830	70000	70000	0
1992	8.43	974462	115614	70000	70000	917261	108828	70000	70000	0
1993	8.43	565846	67134	70000	67134	508645	60348	70000	60348	6787
1994	8.43	554846	65829	70000	65829	497645	59043	70000	59043	6787
1995	8.43	713385	84639	70000	70000	656184	77852	70000	70000	0
1996	8.43	788385	93537	70000	70000	731184	86751	70000	70000	0
1997	8.43	1221538	144928	70000	70000	1164338	138142	70000	70000	0
Average Actual Supportable Capacities (kW) :						67719				65628
										2091

Explanation of Calculations. Column (1): Required hours on peak from Table 4-1. Columns (2) and (6): Average weekly energy after water supply withdrawals is calculated by subtracting the average hydro energy loss specified in Table 3-3 June through August. Column (3): Column (2)/Column (1). Columns (4) and (8): From Machine Capability Calculations specified in Table 4-1. Column (5): The lesser of Column (3) and Column (4). Column (7): Column (6)/Column (1). Column (9): The lesser of Column (7) and Column (8). Column (10): Column (5) - Column (9).

TABLE 4-4
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Wolf Creek Project, 1.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	
1981	79.74	21849462	274006	312000	274006	21846041	273963	312000	273963	43
1987	79.74	13696846	171767	312000	171767	13693425	171724	312000	171724	43
1988	79.74	9296231	116580	312000	116580	9292810	116538	312000	116538	43
1989	79.74	28920000	362675	312000	312000	28916579	362632	312000	312000	0
1990	79.74	13349615	167412	312000	167412	13346194	167370	312000	167370	43
1991	79.74	14660846	183856	312000	183856	14657425	183813	312000	183813	43
1992	79.74	17941692	225000	312000	225000	17938271	224957	312000	224957	43
1993	79.74	12380308	155257	312000	155257	12376887	155214	312000	155214	43
1994	79.74	13479538	169042	312000	169042	13476117	168999	312000	168999	43
1995	79.74	14693692	184268	312000	184268	14690271	184225	312000	184225	43
1996	79.74	22254692	279088	312000	279088	22251271	279045	312000	279045	43
1997	79.74	25044538	314074	312000	312000	25041117	314031	312000	312000	0
Average Actual Supportable Capacities (kW) :						206934				206899
										35

TABLE 4-5
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Wolf Creek Project, 10.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	
1981	79.74	21849462	274006	312000	274006	21815289	273577	312000	273577	429
1987	79.74	13696846	171767	312000	171767	13662674	171338	312000	171338	429
1988	79.74	9296231	116580	312000	116580	9262058	116152	312000	116152	429
1989	79.74	28920000	362675	312000	312000	28885827	362246	312000	312000	0
1990	79.74	13349615	167412	312000	167412	13315443	166984	312000	166984	429
1991	79.74	14660846	183856	312000	183856	14626674	183428	312000	183428	429
1992	79.74	17941692	225000	312000	225000	17907520	224571	312000	224571	429
1993	79.74	12380308	155257	312000	155257	12346135	154828	312000	154828	429
1994	79.74	13479538	169042	312000	169042	13445366	168613	312000	168613	429
1995	79.74	14693692	184268	312000	184268	14659520	183839	312000	183839	429
1996	79.74	22254692	279088	312000	279088	22220520	278659	312000	278659	429
1997	79.74	25044538	314074	312000	312000	25010366	313645	312000	312000	0
Average Actual Supportable Capacities (kW) :						206934				206583
										351

Explanation of Calculations. Column (1): Required hours on peak from Table 4-1. Columns (2) and (6): Average weekly energy after water supply withdrawals is calculated by subtracting the average hydro energy loss specified in Table 3-3 June through August. Column (3): Column (2)/Column (1). Columns (4) and (8): From Machine Capability Calculations specified in Table 4-1. Column (5): The lesser of Column (3) and Column (4). Column (7): Column (6)/Column (1). Column (9): The lesser of Column (7) and Column (8). Column (10): Column (5) - Column (9).

TABLE 4-6
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Cordell Hull Project, 1.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	
1981	92.25	9132762	98997	114000	98997	9131646	98985	114000	98985	12
1987	92.25	6175615	66943	114000	66943	6174500	66930	114000	66930	12
1988	92.25	4309385	46713	114000	46713	4308269	46701	114000	46701	12
1989	92.25	10972923	118944	114000	114000	10971808	118932	114000	114000	0
1990	92.25	5969846	64712	114000	64712	5968731	64700	114000	64700	12
1991	92.25	6336077	68682	114000	68682	6334962	68670	114000	68670	12
1992	92.25	8308308	90060	114000	90060	8307192	90048	114000	90048	12
1993	92.25	5559615	60265	114000	60265	5558500	60253	114000	60253	12
1994	92.25	6169077	66872	114000	66872	6167962	66860	114000	66860	12
1995	92.25	6563692	71149	114000	71149	6562577	71137	114000	71137	12
1996	92.25	8778077	95153	114000	95153	8776962	95141	114000	95141	12
1997	92.25	9903000	107347	114000	107347	9901885	107335	114000	107335	12
Average Actual Supportable Capacities (kW) :						77445				77434
										11

TABLE 4-7
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Cordell Hull Project, 10.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	
1981	92.25	9132762	98997	114000	98997	9121619	98877	114000	98877	121
1987	92.25	6175615	66943	114000	66943	6164473	66822	114000	66822	121
1988	92.25	4309385	46713	114000	46713	4298242	46592	114000	46592	121
1989	92.25	10972923	118944	114000	114000	10961780	118824	114000	114000	0
1990	92.25	5969846	64712	114000	64712	5958703	64591	114000	64591	121
1991	92.25	6336077	68682	114000	68682	6324934	68561	114000	68561	121
1992	92.25	8308308	90060	114000	90060	8297165	89940	114000	89940	121
1993	92.25	5559615	60265	114000	60265	5548473	60144	114000	60144	121
1994	92.25	6169077	66872	114000	66872	6157934	66751	114000	66751	121
1995	92.25	6563692	71149	114000	71149	6552549	71028	114000	71028	121
1996	92.25	8778077	95153	114000	95153	8766934	95032	114000	95032	121
1997	92.25	9903000	107347	114000	107347	9891857	107226	114000	107226	121
Average Actual Supportable Capacities (kW) :						77445				77335
										110

Explanation of Calculations. Column (1): Required hours on peak from Table 4-1. Columns (2) and (6): Average weekly energy after water supply withdrawals is calculated by subtracting the average hydro energy loss specified in Table 3-3 June through August. Column (3): Column (2)/Column (1). Columns (4) and (8): From Machine Capability Calculations specified in Table 4-1. Column (5): The lesser of Column (3) and Column (4). Column (7): Column (6)/Column (1). Column (9): The lesser of Column (7) and Column (8). Column (10): Column (5) - Column (9).

TABLE 4-8
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Old Hickory Project, 1.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	
1981	82.83	10105000	122000	116000	116000	10103866	121986	116000	116000	0
1987	82.83	7210538	87054	116000	87054	7209405	87041	116000	87041	14
1988	82.83	4829923	58313	116000	58313	4828789	58299	116000	58299	14
1989	82.83	13368077	161396	116000	116000	13366943	161382	116000	116000	0
1990	82.83	6516231	78672	116000	78672	6515097	78658	116000	78658	14
1991	82.83	7111077	85854	116000	85854	7109943	85840	116000	85840	14
1992	82.83	10307000	124439	116000	116000	10305866	124425	116000	116000	0
1993	82.83	6567692	79293	116000	79293	6566559	79280	116000	79280	14
1994	82.83	8115000	97974	116000	97974	8113866	97961	116000	97961	14
1995	82.83	7672923	92637	116000	92637	7671789	92623	116000	92623	14
1996	82.83	10436000	125996	116000	116000	10434866	125983	116000	116000	0
1997	82.83	11851154	143082	116000	116000	11850020	143068	116000	116000	0
Average Actual Supportable Capacities (kW) :						94891				94882
										9

TABLE 4-9
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Old Hickory Project, 10.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	
1981	82.83	10105000	122000	116000	116000	10093677	121863	116000	116000	0
1987	82.83	7210538	87054	116000	87054	7199215	86918	116000	86918	137
1988	82.83	4829923	58313	116000	58313	4818600	58176	116000	58176	137
1989	82.83	13368077	161396	116000	116000	13356754	161259	116000	116000	0
1990	82.83	6516231	78672	116000	78672	6504908	78535	116000	78535	137
1991	82.83	7111077	85854	116000	85854	7099754	85717	116000	85717	137
1992	82.83	10307000	124439	116000	116000	10295677	124302	116000	116000	0
1993	82.83	6567692	79293	116000	79293	6556369	79157	116000	79157	137
1994	82.83	8115000	97974	116000	97974	8103677	97838	116000	97838	137
1995	82.83	7672923	92637	116000	92637	7661600	92500	116000	92500	137
1996	82.83	10436000	125996	116000	116000	10424677	125860	116000	116000	0
1997	82.83	11851154	143082	116000	116000	11839831	142945	116000	116000	0
Average Actual Supportable Capacities (kW) :						94891				94804
										87

Explanation of Calculations. Column (1): Required hours on peak from Table 4-1. Columns (2) and (6): Average weekly energy after water supply withdrawals is calculated by subtracting the average hydro energy loss specified in Table 3-3 June through August. Column (3): Column (2)/Column (1). Columns (4) and (8): From Machine Capability Calculations specified in Table 4-1. Column (5): The lesser of Column (3) and Column (4). Column (7): Column (6)/Column (1). Column (9): The lesser of Column (7) and Column (8). Column (10): Column (5) - Column (9).

TABLE 4-10
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Cheatham Project, 1.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	
1981	95.47	3627538	37995	41000	37995	3627057	37990	41000	37990	5
1987	95.47	3063077	32083	41000	32083	3062596	32078	41000	32078	5
1988	95.47	1888923	19785	41000	19785	1888442	19780	41000	19780	5
1989	95.47	3959692	41474	41000	41000	3959211	41469	41000	41000	0
1990	95.47	2813231	29466	41000	29466	2812750	29461	41000	29461	5
1991	95.47	3168308	33185	41000	33185	3167827	33180	41000	33180	5
1992	95.47	4350154	45564	41000	41000	4349673	45559	41000	41000	0
1993	95.47	2938000	30773	41000	30773	2937519	30768	41000	30768	5
1994	95.47	3848692	40312	41000	40312	3848211	40307	41000	40307	5
1995	95.47	3550462	37188	41000	37188	3549980	37183	41000	37183	5
1996	95.47	4670769	48922	41000	41000	4670288	48917	41000	41000	0
1997	95.47	3528308	36956	41000	36956	3527827	36951	41000	36951	5
Average Actual Supportable Capacities (kW) :						34795				34792
										4

TABLE 4-11
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Cheatham Project, 10.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	
1981	95.47	3627538	37995	41000	37995	3622734	37945	41000	37945	50
1987	95.47	3063077	32083	41000	32083	3058273	32033	41000	32033	50
1988	95.47	1888923	19785	41000	19785	1884119	19734	41000	19734	50
1989	95.47	3959692	41474	41000	41000	3954888	41424	41000	41000	0
1990	95.47	2813231	29466	41000	29466	2808426	29416	41000	29416	50
1991	95.47	3168308	33185	41000	33185	3163503	33135	41000	33135	50
1992	95.47	4350154	45564	41000	41000	4345350	45514	41000	41000	0
1993	95.47	2938000	30773	41000	30773	2933196	30723	41000	30723	50
1994	95.47	3848692	40312	41000	40312	3843888	40261	41000	40261	50
1995	95.47	3550462	37188	41000	37188	3545657	37138	41000	37138	50
1996	95.47	4670769	48922	41000	41000	4665965	48872	41000	41000	0
1997	95.47	3528308	36956	41000	36956	3523503	36905	41000	36905	50
Average Actual Supportable Capacities (kW) :						34795				37

Explanation of Calculations. Column (1): Required hours on peak from Table 4-1. Columns (2) and (6): Average weekly energy after water supply withdrawals is calculated by subtracting the average hydro energy loss specified in Table 3-3 June through August. Column (3): Column (2)/Column (1). Columns (4) and (8): From Machine Capability Calculations specified in Table 4-1. Column (5): The lesser of Column (3) and Column (4). Column (7): Column (6)/Column (1). Column (9): The lesser of Column (7) and Column (8). Column (10): Column (5) - Column (9).

TABLE 4-12
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Barkley Project, 1.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	
1981	70.80	11186772	157997	148000	148000	11185843	157984	148000	148000	0
1987	70.80	9810846	138564	148000	138564	9809918	138551	148000	138551	13
1988	70.80	4393308	62049	148000	62049	4392379	62036	148000	62036	13
1989	70.80	18579462	262408	148000	148000	18578533	262395	148000	148000	0
1990	70.80	12495846	176486	148000	148000	12494918	176472	148000	148000	0
1991	70.80	14901923	210468	148000	148000	14900995	210455	148000	148000	0
1992	70.80	17756154	250780	148000	148000	17755225	250767	148000	148000	0
1993	70.80	8979615	126824	148000	126824	8978687	126811	148000	126811	13
1994	70.80	16637077	234974	148000	148000	16636149	234961	148000	148000	0
1995	70.80	10169538	143630	148000	143630	10168610	143617	148000	143617	13
1996	70.80	14706538	207708	148000	148000	14705610	207695	148000	148000	0
1997	70.80	15718615	222002	148000	148000	15717687	221989	148000	148000	0
Average Actual Supportable Capacities (kW) :						137006				137001
										5

TABLE 4-13
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Barkley Project, 10.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	
1981	70.80	11186772	157997	148000	148000	11177495	157866	148000	148000	0
1987	70.80	9810846	138564	148000	138564	9801570	138433	148000	138433	131
1988	70.80	4393308	62049	148000	62049	4384031	61918	148000	61918	131
1989	70.80	18579462	262408	148000	148000	18570185	262277	148000	148000	0
1990	70.80	12495846	176486	148000	148000	12486570	176355	148000	148000	0
1991	70.80	14901923	210468	148000	148000	14892647	210337	148000	148000	0
1992	70.80	17756154	250780	148000	148000	17746878	250649	148000	148000	0
1993	70.80	8979615	126824	148000	126824	8970339	126693	148000	126693	131
1994	70.80	16637077	234974	148000	148000	16627801	234843	148000	148000	0
1995	70.80	10169538	143630	148000	143630	10160262	143499	148000	143499	131
1996	70.80	14706538	207708	148000	148000	14697262	207577	148000	148000	0
1997	70.80	15718615	222002	148000	148000	15709339	221871	148000	148000	0
Average Actual Supportable Capacities (kW) :						137006				136958
										48

Explanation of Calculations. Column (1): Required hours on peak from Table 4-1. Columns (2) and (6): Average weekly energy after water supply withdrawals is calculated by subtracting the average hydro energy loss specified in Table 3-3 June through August. Column (3): Column (2)/Column (1). Columns (4) and (8): From Machine Capability Calculations specified in Table 4-1. Column (5): The lesser of Column (3) and Column (4). Column (7): Column (6)/Column (1). Column (9): The lesser of Column (7) and Column (8). Column (10): Column (5) - Column (9).

TABLE 4-14
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Dale Hollow, 1.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Machine Capability (kW)	
1981	50.79	2438308	48006	62000	48006	2435459	47950	62000	47950	56
1987	50.79	2563769	50476	62000	50476	2560920	50420	62000	50420	56
1988	50.79	1292615	25449	62000	25449	1289767	25393	62000	25393	56
1989	50.79	3816692	75144	62000	62000	3813843	75088	62000	62000	0
1990	50.79	2358231	46429	62000	46429	2355382	46373	62000	46373	56
1991	50.79	2311385	45507	62000	45507	2308536	45451	62000	45451	56
1992	50.79	2509077	49399	62000	49399	2506228	49343	62000	49343	56
1993	50.79	2236154	44026	62000	44026	2233035	43970	62000	43970	56
1994	50.79	2801385	55154	62000	55154	2798536	55098	62000	55098	56
1995	50.79	2771385	54564	62000	54564	2768536	54508	62000	54508	56
1996	50.79	2261615	44527	62000	44527	2258767	44471	62000	44471	56
1997	50.79	3868923	76172	62000	62000	3866074	76116	62000	62000	0
Average Actual Supportable Capacities (kW) :						49048				49003
										46

TABLE 4-15
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Dale Hollow Project, 10.0 MGD Average Withdrawal)

Year	On Peak	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Required Hours	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	Actual Support Capacity (kW)	Weekly Energy wks 23-35 (kWh)	Potential Support Capacity (kW)	Average Machine Capability (kW)	
1981	50.79	2438308	48006	62000	48006	2409848	47446	62000	47446	560
1987	50.79	2563769	50476	62000	50476	2535310	49916	62000	49916	560
1988	50.79	1292615	25449	62000	25449	1264156	24889	62000	24889	560
1989	50.79	3816692	75144	62000	62000	3788233	74584	62000	62000	0
1990	50.79	2358231	46429	62000	46429	2329771	45869	62000	45869	560
1991	50.79	2311385	45507	62000	45507	2282925	44947	62000	44947	560
1992	50.79	2509077	49399	62000	49399	2480618	48839	62000	48839	560
1993	50.79	2236154	44026	62000	44026	2207695	43466	62000	43466	560
1994	50.79	2801385	55154	62000	55154	2772925	54594	62000	54594	560
1995	50.79	2771385	54564	62000	54564	2742925	54003	62000	54003	560
1996	50.79	2261615	44527	62000	44527	2233156	43967	62000	43967	560
1997	50.79	3868923	76172	62000	62000	3840464	75612	62000	62000	0
Average Actual Supportable Capacities (kW) :						49048				48590
										458

Explanation of Calculations. Column (1): Required hours on peak from Table 4-1. Columns (2) and (6): Average weekly energy after water supply withdrawals is calculated by subtracting the average hydro energy loss specified in Table 3-3 June through August. Column (3): Column (2)/Column (1). Columns (4) and (8): From Machine Capability Calculations specified in Table 4-1. Column (5): The lesser of Column (3) and Column (4). Column (7): Column (6)/Column (1). Column (9): The lesser of Column (7) and Column (8). Column (10): Column (5) - Column (9).

TABLE 4-16
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Center Hill Project, 1.0 MGD Average Withdrawal)

Year	Required Hours	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Average Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	Actual Support Capacity	Average Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	Actual Support Capacity	
On Peak	(kWh)	(kW)	(kW)	(kW)	(kW)	(kWh)	(kW)	(kW)	(kW)	(kW)
1981	28.71	3416308	119011	156000	119011	3412866	118891	150000	118891	120
1987	28.71	3556462	123893	156000	123893	3553020	123773	156000	123773	120
1988	28.71	2046000	71275	156000	71275	2042558	71155	156000	71155	120
1989	28.71	13034231	454061	156000	156000	13030789	453941	156000	156000	0
1990	28.71	2877231	100231	156000	100231	2873789	100111	156000	100111	120
1991	28.71	2852769	99379	156000	99379	2849327	99259	156000	99259	120
1992	28.71	5948615	207226	156000	156000	5945173	207106	156000	156000	0
1993	28.71	3880692	135188	156000	135188	3877250	135068	156000	135068	120
1994	28.71	6024077	209855	156000	156000	6020635	209735	156000	156000	0
1995	28.71	4044154	140882	156000	140882	4040712	140763	156000	140763	120
1996	28.71	4642077	161712	156000	156000	4638635	161592	156000	156000	0
1997	28.71	9967615	347233	156000	156000	9964173	347113	156000	156000	0

Average Actual Supportable Capacities (kW) : 131895 131830 65

TABLE 4-17
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(Center Hill Project, 10.0 MGD Average Withdrawal)

Year	Required Hours	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Average Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	Actual Support Capacity	Average Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	Actual Support Capacity	
On Peak	(kWh)	(kW)	(kW)	(kW)	(kW)	(kWh)	(kW)	(kW)	(kW)	(kW)
1981	28.71	3416308	119011	150000	119011	3381926	117813	150000	117813	1198
1987	28.71	3556462	123893	156000	123893	3522080	122695	156000	122695	1198
1988	28.71	2046000	71275	156000	71275	2011618	70077	156000	70077	1198
1989	28.71	13034231	454061	156000	156000	12999849	452864	156000	156000	0
1990	28.71	2877231	100231	156000	100231	2842849	99034	156000	99034	1198
1991	28.71	2852769	99379	156000	99379	2818387	98182	156000	98182	1198
1992	28.71	5948615	207226	156000	156000	5914233	206029	156000	156000	0
1993	28.71	3880692	135188	156000	135188	3846310	133990	156000	133990	1198
1994	28.71	6024077	209855	156000	156000	5989695	208657	156000	156000	0
1995	28.71	4044154	140882	156000	140882	4009772	139685	156000	139685	1198
1996	28.71	4642077	161712	156000	156000	4607695	160514	156000	156000	0
1997	28.71	9967615	347233	156000	156000	9933233	346035	156000	156000	0

Average Actual Supportable Capacities (kW) : 131895 131242 653

Explanation of Calculations. Column (1): Required hours on peak from Table 4-1. Columns (2) and (6): Average weekly energy after water supply withdrawals is calculated by subtracting the average hydro energy loss specified in Table 3-3 June through August. Column (3): Column (2)/Column (1). Columns (4) and (8): From Machine Capability Calculations specified in Table 4-1. Column (5): The lesser of Column (3) and Column (4). Column (7): Column (6)/Column (1). Column (9): The lesser of Column (7) and Column (8). Column (10): Column (5) - Column (9).

TABLE 4-18
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(J. Percy Priest Project, 1.0 MGD Average Withdrawal)

Year	Required Hours	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	Actual Support Capacity	Weekly Energy wks 23-35	Potential Support Capacity	Machine Capability	Actual Support Capacity	
On Peak	(kWh)	(kW)	(kW)	(kW)	(kW)	(kWh)	(kW)	(kW)	(kW)	(kW)
1981	12.78	408846	31988	30000	30000	406946	31839	30000	30000	0
1987	12.78	13077	1023	30000	1023	11177	874	30000	874	149
1988	12.78	27692	2167	30000	2167	25792	2018	30000	2018	149
1989	12.78	2565538	200727	30000	30000	2563639	200578	30000	30000	0
1990	12.78	106154	8305	30000	8305	104254	8157	30000	8157	149
1991	12.78	244077	19096	30000	19096	242177	18948	30000	18948	149
1992	12.78	941615	73672	30000	30000	939715	73523	30000	30000	0
1993	12.78	210000	16430	30000	16430	208100	16282	30000	16282	149
1994	12.78	822692	64367	30000	30000	820792	64218	30000	30000	0
1995	12.78	284077	22226	30000	22226	282177	22077	30000	22077	149
1996	12.78	1148154	89831	30000	30000	1146254	89682	30000	30000	0
1997	12.78	1433154	112129	30000	30000	1431254	111981	30000	30000	0

Average Actual Supportable Capacities (kW) :

19932

19851

81

TABLE 4-19
CALCULATION OF PROJECT SUPPORTABLE CAPACITY
BEFORE AND AFTER WATER SUPPLY WITHDRAWALS
(J. Percy Priest Project, 10.0 MGD Average Withdrawal)

Year	Required Hours	Calculations Before Withdrawals				Calculations After Withdrawals				Lost Capacity
		Weekly Energy wks 23-35	Potential Support Capacity	Average Machine Capability	Actual Support Capacity	Weekly Energy wks 23-35	Potential Support Capacity	Average Machine Capability	Actual Support Capacity	
On Peak	(kWh)	(kW)	(kW)	(kW)	(kW)	(kWh)	(kW)	(kW)	(kW)	(kW)
1981	12.78	408846	31988	30000	30000	389888	30505	30000	30000	0
1987	12.78	13077	1023	30000	1023	0	0	30000	0	1023
1988	12.78	27692	2167	30000	2167	8713	682	30000	682	1485
1989	12.78	2565538	200727	30000	30000	2546559	199242	30000	30000	0
1990	12.78	106154	8305	30000	8305	87174	6820	30000	6820	1485
1991	12.78	244077	19096	30000	19096	225097	17612	30000	17612	1485
1992	12.78	941615	73672	30000	30000	922636	72187	30000	30000	0
1993	12.78	210000	16430	30000	16430	191021	14945	30000	14945	1485
1994	12.78	822692	64367	30000	30000	803713	62882	30000	30000	0
1995	12.78	284077	22226	30000	22226	265097	20741	30000	20741	1485
1996	12.78	1148154	89831	30000	30000	1129174	88346	30000	30000	0
1997	12.78	1433154	112129	30000	30000	1414174	110644	30000	30000	0

Average Actual Supportable Capacities (kW) :

19932

19122

768

Explanation of Calculations. Column (1): Required hours on peak from Table 4-1. Columns (2) and (6): Average weekly energy after water supply withdrawals is calculated by subtracting the average hydro energy loss specified in Table 3-3 June through August. Column (3): Column (2)/Column (1). Columns (4) and (8): From Machine Capability Calculations specified in Table 4-1. Column (5): The lesser of Column (3) and Column (4). Column (7): Column (6)/Column (1). Column (9): The lesser of Column (7) and Column (8). Column (10): Column (5) - Column (9).

4.05 CAPACITY VALUES

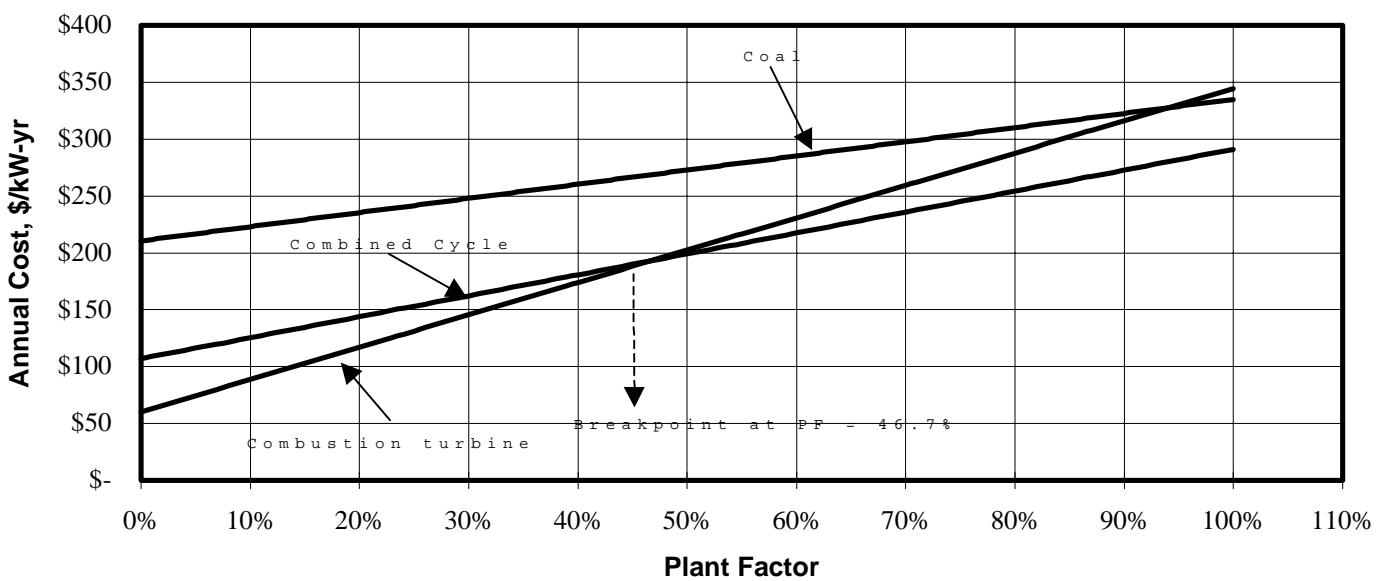
a. Base Values. Unit capacity values for the projects in the Cumberland River Basin area were calculated using a capacity model developed by the Federal Energy Regulatory Commission (FERC) (see Appendix A). These values include allowances for transmission costs, ancillary services cost, and incorporate capacity value adjustments to account for differences in reliability and operating flexibility between hydro and the thermal alternative.

These capacity values, which are at October 1, 1998 price levels and a Federal interest rate of 6-7/8 percent, are shown below.

Gas combined cycle capacity value:	\$107.07/kilowatt-year
Gas combustion turbine capacity value:	\$60.27/kilowatt-year

b. Most Likely Alternative. The most likely alternative was determined to be a mix of 47% gas-fired combustion turbine, and 53% gas-fired combined cycle. This mix was determined by use of a screening curve to determine what type of plants would most likely serve as a replacement for the generation lost due to the potential water supply withdrawals. The composite capacity value for this mix was computed by weighting the base capacity values as follows.

$$\text{Composite capacity value} = (0.47)(60.27) + (0.53)(107.07) = \underline{\$85.07/\text{kW-yr}}$$



c. Total Adjusted Capacity Value. The capacity values developed using FERC methodology have a 5% Hydromechanical Availability Factor (HMA) included to account for the value of ancillary services such as providing reserves, voltage regulation, and others. In this analysis, data was available on the value of the ancillary services. This information was obtained from SEPA. Therefore, the 5% HMA factor was removed from the FERC capacity value and specific values for the ancillary services were added. The calculations used to derive these values are described below.

$$\text{Removing 5\% HMA factor} = 0.95 * \$85.07 / \text{kW-yr} = \$80.82 / \text{kW-yr}$$

The individual of ancillary services values are as follows:

a. Scheduling, System Control, and Dispatch Rate Calculation	\$ 1.32 /kW-yr
b. Reactive Service	\$ 2.42 /kW-yr
c. Regulation and Frequency Response	\$ 0.26 /kW-yr
d. Spinning Reserves	\$ 3.55
/kW-yr	
e. Supplemental Reserves	\$ 0.76 /kW-yr
Total	\$11.21 /kW-yr

Thus the total adjusted capacity value is as follow:

Total ancillary service	\$11.21 /kW-yr
Composite capacity value	\$80.82 /kW-yr
Total Adjusted Capacity Value	\$92.03 /kW-yr

4.06 CAPACITY BENEFITS FOREGONE

The capacity benefits foregone for each withdrawal case were computed by applying the capacity value derived above to the corresponding dependable capacity losses given in Section 4.04. The capacity benefits foregone for each project are listed in Tables 5-1 and 5-2 of Chapter 5.

CHAPTER 5: TOTAL BENEFITS FOREGONE

5.01 GENERAL

The objective of this study was to develop unit values of power benefits foregone that can be applied to a range of withdrawals from any reservoirs in the Cumberland River System. Using the process described in Section 3.01, the total energy benefits foregone for each of the projects were computed. Capacity benefits foregone were then computed as described in Section 4.06, and added to these amounts in order to arrive at total hydropower benefit losses due to water supply withdrawals at each project.

5.02 SUMMARY OF POWER BENEFITS FOREGONE

Unit Values. Tables 5-1 and 5-2 provide unit power benefits foregone (including both energy and capacity benefits) for 1.0 MGD and 10.0 MGD withdrawn from the nine reservoirs.

TABLE 5-1a
TOTAL HYDROPOWER BENEFIT LOSSES DUE TO
WATER WITHDRAWALS OF 1.0 MGD

(For Water Supply Contracts Executed in 2000)

	<u>Laurel</u>	<u>Wolf Creek</u>	<u>Cordell Hull</u>	<u>Old Hickory</u>	<u>Cheatham</u>	<u>Barkley</u>	<u>Dale Hollow</u>	<u>Center Hill</u>	<u>J. Percy Priest</u>	<u>Total</u>
Reduction in Streamflow	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	
Annual Energy ¹ losses (kWh)	266,400	159,200	51,900	52,700	22,400	43,200	132,600	160,100	88,400	976,900
Annual Energy ² benefit foregone	\$8,484	\$4,488	\$1,445	\$1,418	\$591	\$1,140	\$3,869	\$4,586	\$2,333	28,354
Capacity losses ³ (kilowatts)	185.29	35.10	10.99	8.71	3.66	4.77	45.89	65.40	81.08	440.90
Capacity value ⁴ (\$/kW-yr)	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03
Capacity benefit ⁵ foregone	\$17,052	\$3,230	\$1,012	\$802	\$337	\$439	\$4,223	\$6,019	\$7,462	\$40,576
Total annual⁶ benefit loss	\$25,536	\$7,718	\$2,457	\$2,220	\$928	\$1,579	\$8,092	\$10,605	\$9,795	\$68,930

¹ From Table 3-3.

² From Table 3-5.

³ From Table 4-2 through Table 4-19

⁴ From Section 4.05c.

⁵ The product of capacity losses and capacity value.

⁶ Sum of annual energy benefits forgone and capacity benefits foregone.

TABLE 5-1b
TOTAL HYDROPOWER BENEFIT LOSSES DUE TO
WATER WITHDRAWALS OF 1.0 MGD

(For Water Supply Contracts Executed in 2005)

	Laurel	Wolf Creek	Cordell Hull	Old Hickory	Cheatham	Barkley	Dale Hollow	Center Hill	J. Percy Priest	Total
Reduction in Streamflow	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	
Annual Energy ¹ losses (kWh)	266,400	159,200	51,900	52,700	22,400	43,200	132,600	160,100	88,400	976,900
Annual Energy ² benefit foregone	\$9,628	\$5,138	\$1,655	\$1,595	\$671	\$1,277	\$4,450	\$5,270	\$2,613	\$32,297
Capacity losses ³ (kilowatts)	185.29	35.10	10.99	8.71	3.66	4.77	45.89	65.40	81.08	440.90
Capacity value ⁴ (\$/kW-yr)	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03
Capacity benefit ⁵ foregone	\$17,052	\$3,230	\$1,012	\$802	\$337	\$439	\$4,223	\$6,019	\$7,462	\$40,576
Total annual⁶ benefit loss	\$26,680	\$8,368	\$2,667	\$2,397	\$1,008	\$1,716	\$8,673	\$11,289	\$10,075	\$72,873

¹ From Table 3-3.

² From Table 3-5.

³ From Table 4-2 through Table 4-19

⁴ From Section 4.05c.

⁵ The product of capacity losses and capacity value.

⁶ Sum of annual energy benefits forgone and capacity benefits foregone.

TABLE 5-1c
TOTAL HYDROPOWER BENEFIT LOSSES DUE TO
WATER WITHDRAWALS OF 1.0 MGD

(For Water Supply Contracts Executed in 2010)

	Laurel	Wolf Creek	Cordell Hull	Old Hickory	Cheatham	Barkley	Dale Hollow	Center Hill	J. Percy Priest	Total
Reduction in Streamflow	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	
Annual Energy ¹ losses (kWh)	266,400	159,200	51,900	52,700	22,400	43,200	132,600	160,100	88,400	976,900
Annual Energy ² benefit foregone	\$13,806	\$7,010	\$2,247	\$2,141	\$877	\$1,685	\$6,183	\$7,061	\$3,448	\$44,458
Capacity losses ³ (kilowatts)	185.29	35.10	10.99	8.71	3.66	4.77	45.89	65.40	81.08	440.90
Capacity value ⁴ (\$/kW-yr)	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03
Capacity benefit ⁵ foregone	\$17,052	\$3,230	\$1,012	\$802	\$337	\$439	\$4,223	\$6,019	\$7,462	\$40,576
Total annual⁶ benefit loss	\$30,858	\$10,240	\$3,259	\$2,943	\$1,214	\$2,124	\$10,406	\$13,080	\$10,910	\$85,034

¹ From Table 3-3.

² From Table 3-5.

³ From Table 4-2 through Table 4-19

⁴ From Section 4.05c.

⁵ The product of capacity losses and capacity value.

⁶ Sum of annual energy benefits forgone and capacity benefits foregone.

TABLE 5-1d
TOTAL HYDROPOWER BENEFIT LOSSES DUE TO
WATER WITHDRAWALS OF 1.0 MGD

(For Water Supply Contracts Executed in 2015)

	Laurel	Wolf Creek	Cordell Hull	Old Hickory	Cheatham	Barkley	Dale Hollow	Center Hill	J. Percy Priest	Total
Reduction in Streamflow	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	
Annual Energy ¹ losses (kWh)	266,400	159,200	51,900	52,700	22,400	43,200	132,600	160,100	88,400	976,900
Annual Energy ² benefit foregone	\$15,885	\$8,227	\$2,619	\$1,484	\$963	\$1,941	\$6,985	\$8,338	\$3,971	\$50,413
Capacity losses ³ (kilowatts)	185.29	35.10	10.99	8.71	3.66	4.77	45.89	65.40	81.08	440.90
Capacity value ⁴ (\$/kW-yr)	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03
Capacity benefit ⁵ foregone	\$17,052	\$3,230	\$1,012	\$802	\$337	\$439	\$4,223	\$6,019	\$7,462	\$40,576
Total annual⁶ benefit loss	\$32,937	\$11,457	\$3,631	\$2,286	\$1,300	\$2,380	\$11,208	\$14,357	\$11,433	\$90,989

¹ From Table 3-3.

² From Table 3-5.

³ From Table 4-2 through Table 4-19

⁴ From Section 4.05c.

⁵ The product of capacity losses and capacity value.

⁶ Sum of annual energy benefits forgone and capacity benefits foregone.

TABLE 5-2a
TOTAL HYDROPOWER BENEFIT LOSSES DUE TO
WATER WITHDRAWALS OF 10.0 MGD

(For Water Supply Contracts Executed in 2000)

	Laurel	Wolf Creek	Cordell Hull	Old Hickory	Cheatham	Barkley	Dale Hollow	Center Hill	J. Percy Priest	Total
Reduction in Streamflow	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	
Annual Energy ¹ losses (kWh)	2,664,700	1,592,000	519,100	527,500	223,800	432,100	1,325,800	1,601,700	884,200	9,770,900
Annual Energy ² benefit foregone	\$85,820	\$44,876	\$14,434	\$14,176	\$5,907	\$11,401	\$38,436	\$45,911	\$23,327	\$284,288
Capacity losses ³ (kilowatts)	2090.84	350.63	109.81	87.00	36.60	47.64	458.44	653.31	767.99	4602.24
Capacity value ⁴ (\$/kW-yr)	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03
Capacity benefit ⁵ foregone	\$192,420	\$32,268	\$10,105	\$8,006	\$3,368	\$4,384	\$42,190	\$60,124	\$70,678	\$423,544
Total annual⁶ benefit loss	\$278,240	\$77,144	\$24,539	\$22,182	\$9,275	\$15,785	\$80,626	\$106,035	\$94,005	\$707,832

¹ From Table 3-4.

² From Table 3-6.

³ From Table 4-2 through Table 4-19

⁴ From Section 4.05c.

⁵ The product of capacity losses and capacity value.

⁶ Sum of annual energy benefits forgone and capacity benefits foregone.

TABLE 5-2b
TOTAL HYDROPOWER BENEFIT LOSSES DUE TO
WATER WITHDRAWALS OF 10.0 MGD

(For Water Supply Contracts Executed in 2005)

	Laurel	Wolf Creek	Cordell Hull	Old Hickory	Cheatham	Barkley	Dale Hollow	Center Hill	J. Percy Priest	Total
Reduction in Streamflow	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	
Annual Energy ¹ losses (kWh)	2,664,700	1,592,000	519,100	527,500	223,800	432,100	1,325,800	1,601,700	884,200	9,770,900
Annual Energy ² benefit foregone	\$97,374	\$51,395	\$16,584	\$15,952	\$6,692	\$12,772	\$44,167	\$52,768	\$26,132	\$323,836
Capacity losses ³ (kilowatts)	2090.84	350.63	109.81	87.00	36.60	47.64	458.44	653.31	767.99	4602.24
Capacity value ⁴ (\$/kW-yr)	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03
Capacity benefit ⁵ foregone	\$192,420	\$32,268	\$10,105	\$8,006	\$3,368	\$4,384	\$42,190	\$60,124	\$70,678	\$423,544
Total annual⁶ benefit loss	\$289,794	\$83,663	\$26,689	\$23,958	\$10,060	\$17,156	\$86,357	\$112,892	\$96,810	\$747,380

¹ From Table 3-4.

² From Table 3-6.

³ From Table 4-2 through Table 4-19

⁴ From Section 4.05c.

⁵ The product of capacity losses and capacity value.

⁶ Sum of annual energy benefits forgone and capacity benefits foregone.

TABLE 5-2c
TOTAL HYDROPOWER BENEFIT LOSSES DUE TO
WATER WITHDRAWALS OF 10.0 MGD

(For Water Supply Contracts Executed in 2010)

	Laurel	Wolf Creek	Cordell Hull	Old Hickory	Cheatham	Barkley	Dale Hollow	Center Hill	J. Percy Priest	Total
Reduction in Streamflow	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	
Annual Energy ¹ losses (kWh)	2,664,700	1,592,000	519,100	527,500	223,800	432,100	1,325,800	1,601,700	884,200	9,770,900
Annual Energy ² benefit foregone	\$138,525	\$70,239	\$22,353	\$21,424	\$8,702	\$16,862	\$61,514	\$70,677	\$34,501	\$444,797
Capacity losses ³ (kilowatts)	2090.84	350.63	109.81	87.00	36.60	47.64	458.44	653.31	767.99	4602.24
Capacity value ⁴ (\$/kW-yr)	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03
Capacity benefit ⁵ foregone	\$192,420	\$32,268	\$10,105	\$8,006	\$3,368	\$4,384	\$42,190	\$60,124	\$70,678	\$423,544
Total annual⁶ benefit loss	\$330,945	\$102,507	\$32,458	\$29,430	\$12,070	\$21,246	\$103,704	\$130,801	\$105,179	\$868,341

¹ From Table 3-4.

² From Table 3-6.

³ From Table 4-2 through Table 4-19

⁴ From Section 4.05c.

⁵ The product of capacity losses and capacity value.

⁶ Sum of annual energy benefits forgone and capacity benefits foregone.

TABLE 5-2d
TOTAL HYDROPOWER BENEFIT LOSSES DUE TO
WATER WITHDRAWALS OF 10.0 MGD

(For Water Supply Contracts Executed in 2015)

	Laurel	Wolf Creek	Cordell Hull	Old Hickory	Cheatham	Barkley	Dale Hollow	Center Hill	J. Percy Priest	Total
Reduction in Streamflow	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	
Annual Energy ¹ losses (kWh)	2,664,700	1,592,000	519,100	527,500	223,800	432,100	1,325,800	1,601,700	884,200	9,770,900
Annual Energy ² benefit foregone	\$160,659	\$82,589	\$26,138	\$24,847	\$9,638	\$19,422	\$69,304	\$83,387	\$39,739	\$515,723
Capacity losses ³ (kilowatts)	2090.84	350.63	109.81	87.00	36.60	47.64	458.44	653.31	767.99	4602.24
Capacity value ⁴ (\$/kW-yr)	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03	\$92.03
Capacity benefit ⁵ foregone	\$192,420	\$32,268	\$10,105	\$8,006	\$3,368	\$4,384	\$42,190	\$60,124	\$70,678	\$423,544
Total annual⁶ benefit loss	\$353,079	\$114,857	\$36,243	\$32,853	\$13,006	\$23,806	\$111,494	\$143,511	\$110,417	\$939,267

¹ From Table 3-4.

² From Table 3-6.

³ From Table 4-2 through Table 4-19

⁴ From Section 4.05c.

⁵ The product of capacity losses and capacity value.

⁶ Sum of annual energy benefits forgone and capacity benefits foregone.

CHAPTER 6: REVENUES FOREGONE

6.01 GENERAL

Revenues foregone are to be based on the current rates of the marketing agency, which in the case of the Cumberland River projects is the Southeastern Power Administration (SEPA). The rates that are in effect as of 1 October 1998 are as follows;

Energy charge:	7.21 mills/kWh
Capacity charge:	\$32.04/kW-year

The energy charge would be applied to the average annual energy losses calculated in Section 3.03. The capacity charge, however, would be applied to the loss in marketable capacity rather than the loss in dependable capacity.

6.02 LOSS IN MARKETABLE CAPACITY

Under SEPA's current marketing procedures, the amount of capacity that it can market is based on the capacity that can be supported during the 1981 water conditions, 1981 being among the lower water years for the Cumberland River system in the period of record.

6.03 MARKETABLE CAPACITY VS. DEPENDABLE CAPACITY

It will be noted that the marketable capacity losses can vary from the dependable capacity computed in Section 4.04. The difference is because the two parameters are measuring entirely different quantities. The dependable capacity is an NED value, which is intended to measure the economic impact on the region as a whole, while the marketable capacity is a financial parameter that applies only to a single entity, SEPA.

SEPA is a relatively small power producer, and it has only one source of generation to market - hydropower. If it suffers a drought water year, all of the generating capacity in its system is adversely impacted. Hence, it must measure its marketable capacity by its output in a drought year (1981).

By contrast, the regional power system (the Southeast Power Pool) is a large, diverse power system, of which a relatively small percentage of the capacity is hydropower. In such a system, an adverse water year has only a minor impact on system peak load-carrying capability. The loss in generating capability at hydro projects can be made up with generation from other types of capacity, which are not affected by low water conditions. Therefore, the average peaking capacity in the peak demand months is the most appropriate method for computing NED dependable capacity (see EM 1110-2-1701, *Hydropower*, Section 6-7h).

6.04 TOTAL REVENUES FOREGONE

Tables 6-1 and 6-2 show the computation of total revenues foregone for withdrawals from the nine reservoirs.

Referring to Tables 4.2 through 4.19, the loss in capacity under 1981 water conditions at each of the projects would be as follows:

<u>Project</u>	<u>Withdrawal</u>	<u>Loss in Marketable Capacity</u>	<u>Loss in Dependable Capacity</u>
Laurel	1.0 MGD	679 kW	185
Wolf Creek	1.0 MGD	43 kW	35
Cordell Hull	1.0 MGD	12 kW	11
Old Hickory	1.0 MGD	0 kW	9
Cheatham	1.0 MGD	5 kW	4
Barkley	1.0 MGD	0 kW	5
Dale Hollow	1.0 MGD	56 kW	46
Center Hill	1.0 MGD	120 kW	65
J. Percy Priest	1.0 MGD	0 kW	81

<u>Project</u>	<u>Withdrawal</u>	<u>Loss in Marketable Capacity</u>	<u>Loss in Dependable Capacity</u>
Laurel	10.0 MGD	6787 kW	2091
Wolf Creek	10.0 MGD	429 kW	351
Cordell Hull	10.0 MGD	121 kW	110
Old Hickory	10.0 MGD	0 kW	87
Cheatham	10.0 MGD	50 kW	37
Barkley	10.0 MGD	0 kW	48
Dale Hollow	10.0 MGD	560 kW	458
Center Hill	10.0 MGD	1198 kW	653
J. Percy Priest	10.0 MGD	0 kW	768

TABLE 6-1
TOTAL REVENUES FOREGONE DUE TO
WATER WITHDRAWALS OF 1.0 MGD

(For Water Supply Contracts Executed in 2000)

	<u>Laurel</u>	<u>Wolf Creek</u>	<u>Cordell Hull</u>	<u>Old Hickory</u>	<u>Cheatham</u>	<u>Barkley</u>	<u>Dale Hollow</u>	<u>Center Hill</u>	<u>J. Percy Priest</u>	<u>Total</u>
Reduction in Streamflow	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	1.0 MGD	
Annual Energy ¹ losses (kWh)	266,419	159,162	51,899	52,739	22,376	43,204	132,553	160,137	88,399	976,890
Energy charge benefit foregone	7.21	7.21	7.21	7.21	7.21	7.21	7.21	7.21	7.21	7.21
Annual Energy ² revenues foregone	\$1,921	\$1,148	\$374	\$380	\$161	\$312	\$956	\$1,155	\$637	\$7,043
Capacity losses ³ (kilowatts)	185.29	35.10	10.99	8.71	3.66	4.77	45.89	65.40	81.08	440.90
Capacity charge (\$/kW-yr)	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04
Capacity revenues ⁴ foregone	\$5,937	\$1,125	\$352	\$279	\$117	\$153	\$1,470	\$2,096	\$2,598	\$14,126
Total annual ⁵ revenue	\$7,858	\$2,272	\$726	\$659	\$279	\$464	\$2,426	\$3,250	\$3,235	\$21,170

¹ From Table 3-3.

² Product of annual energy losses and SEPA's energy charge.

³ From Table 4-2 through Table 4-19.

⁴ Product of capacity losses and SEPA's capacity charge.

⁵ Sum of annual energy revenues foregone and capacity revenues foregone.

TABLE 6-2
TOTAL REVENUES FOREGONE DUE TO
WATER WITHDRAWALS OF 10.0 MGD

(For Water Supply Contracts Executed in 2000)

	<u>Laurel</u>	<u>Wolf Creek</u>	<u>Cordell Hull</u>	<u>Old Hickory</u>	<u>Cheatham</u>	<u>Barkley</u>	<u>Dale Hollow</u>	<u>Center Hill</u>	<u>J. Percy Priest</u>	<u>Total</u>
Reduction in Streamflow	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD	10.0 MGD
Annual Energy ¹ losses (kWh)	2,664,749	1,591,958	519,102	527,501	223,812	432,136	1,325,813	1,601,710	884,179	9,770,961
Energy charge benefit foregone	7.21	7.21	7.21	7.21	7.21	7.21	7.21	7.21	7.21	7.21
Annual Energy ² revenues foregone	\$19,213	\$11,478	\$3,743	\$3,803	\$1,614	\$3,116	\$9,559	\$11,548	\$6,375	\$70,449
Capacity losses ³ (kilowatts)	2090.84	350.63	109.81	87.00	36.60	47.64	458.44	653.31	767.99	4602.24
Capacity charge (\$/kW-yr)	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04
Capacity revenues ⁴ foregone	\$66,990	\$11,234	\$3,518	\$2,787	\$1,173	\$1,526	\$14,688	\$20,932	\$24,606	\$147,456
Total annual ⁵ revenue	\$86,203	\$22,712	\$7,261	\$6,591	\$2,786	\$4,642	\$24,248	\$32,480	\$30,981	\$217,904

¹ From Table 3-4.

² Product of annual energy losses and SEPA's energy charge.

³ From Table 4-2 through Table 4-19.

⁴ Product of capacity losses and SEPA's capacity charge.

⁵ Sum of annual energy revenues foregone and capacity revenues foregone.

CHAPTER 7: CREDIT TO MARKETING AGENCY

7.01 GENERAL

The project costs originally allocated to hydropower are being repaid through power revenue which are based on rates designed by the Federal power marketing agency (SEPA) to recover allocated costs plus interest within 50 years of the date of commercial power operation. If a portion of the storage is reallocated from hydropower to water supply, SEPA's repayment obligation must be reduced in proportion to the lost energy and marketable capacity.

Section 4-32d(3) of ER 1105-2-100 (28 Dec 90) states that

"If hydropower revenues are being reduced as a result of the reallocation, the power marketing agency will be credited for the amount of revenues to the Treasury foregone as a result of the reallocation (as determined in (2)(b) above) assuming uniform annual repayment."

Paragraph (2)(b), referenced in the above paragraph, states that

"Revenues foregone to hydropower are the reduction in revenues accruing to the Treasury as a result of the reduction in hydropower outputs based on the existing rates charged by the power marketing agency. Revenues foregone from other project purposes are the reduction in revenues accruing to the Treasury based on any existing repayment agreements."

For purposes of estimating what this cost will be, the energy and marketable capacity values and energy and capacity charges used in Chapter 6 will be used, but no annual escalation rate will be applied to the energy and capacity charges to cover SEPA's estimated real increase in rates in the future, in accordance with paragraph 4-32d(2)(b) of ER 1105-2-100, quoted above.

ER 1105-2-100 also allows the marketing agency credit for any additional costs above the lost revenue to recover costs of purchased power to meet the obligations of the current power sales contract(s) relating to the marketing of power from the hydro project(s) where storage is being reallocated. The continuation of Section 4-32d(3) provides the following guidance:

"In instances where existing contracts between the power marketing agency and their customer would result in a cost to the Federal Government to acquire

replacement power to fulfill the obligations of contracts, an additional credit to the power marketing agency can be made for such costs incurred during the remaining period of the contracts."

In both cases the credit in each year will be based on the revenue actually lost or the replacement costs actually incurred (and documented) by the power marketing agency. However, for purposes of providing an estimate of this credit, the cost of replacement power will be based on the same power values and energy and average capacity losses as were used in the benefits foregone calculations.

7.02 REMAINING PERIOD OF CONTRACT

The length of time remaining under the current power sales contracts had to be identified to determine how many years the SEPA credit would be based on cost of replacement power. This was not a simple matter, because the power is marketed under a number of contracts, each having a different expiration date.

The power from the projects on the Cumberland River is marketed under a contract with SEPA, which expires in 2016. Since these contracts expire in 2016, it was assumed that the cost of replacement power would control for these projects until 2016.

7.03 SEPA CREDIT BY PROJECT

Tables 7-1 through 7-9 show the computation of SEPA capacity and energy credits by project. The lost energy and capacity benefits were taken from Tables 5-1 and 5-2. The lost capacity and energy revenues were taken from Tables 6-1 and 6-2.

TABLE 7-1a
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 1.0 MGD WITHDRAWAL FROM LAUREL PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	17052	5937	17052	8484	1921	8484	---	---	---	---
2001	17052	5937	17052	8484	1921	8484	0.9357	15955	7938	23893
2002	17052	5937	17052	8484	1921	8484	0.8755	14929	7428	22356
2003	17052	5937	17052	8484	1921	8484	0.8192	13969	6950	20918
2004	17052	5937	17052	8484	1921	8484	0.7665	13070	6503	19573
2005	17052	5937	17052	8484	1921	8484	0.7172	12229	6084	18314
2006	17052	5937	17052	8484	1921	8484	0.6710	11443	5693	17136
2007	17052	5937	17052	8484	1921	8484	0.6279	10706	5327	16033
2008	17052	5937	17052	8484	1921	8484	0.5875	10018	4984	15002
2009	17052	5937	17052	8484	1921	8484	0.5497	9373	4664	14037
2010	17052	5937	17052	8484	1921	8484	0.5143	8770	4364	13134
2011	17052	5937	17052	8484	1921	8484	0.4812	8206	4083	12289
2012	17052	5937	17052	8484	1921	8484	0.4503	7678	3820	11499
2013	17052	5937	17052	8484	1921	8484	0.4213	7184	3574	10759
2014	17052	5937	17052	8484	1921	8484	0.3942	6722	3345	10067
2015	17052	5937	17052	8484	1921	8484	0.3689	6290	3129	9419
2016	17052	5937	17052	8484	1921	8484	0.3451	5885	2928	8813
2017	---	5937	5937	---	1921	1921	0.3229	1917	620	2537
2018	---	5937	5937	---	1921	1921	0.3022	1794	580	2374
2019	---	5937	5937	---	1921	1921	0.2827	1678	543	2221
2020	---	5937	5937	---	1921	1921	0.2645	1570	508	2079
2021	---	5937	5937	---	1921	1921	0.2475	1469	475	1945
2022	---	5937	5937	---	1921	1921	0.2316	1375	445	1820
2023	---	5937	5937	---	1921	1921	0.2167	1286	416	1703
2024	---	5937	5937	---	1921	1921	0.2028	1204	389	1593
2025-2069	---	5937	5937	---	1921	1921	2.8012	16630	5381	22010
2070	---	5937	5937	---	1921	1921	0.0095	57	18	75
2071	---	5937	5937	---	1921	1921	0.0089	53	17	70
2072	---	5937	5937	---	1921	1921	0.0083	49	16	65
2073	---	5937	5937	---	1921	1921	0.0078	46	15	61
2074	---	5937	5937	---	1921	1921	0.0073	43	14	57
2075	---	5937	5937	---	1921	1921	0.0068	41	13	54
2076	---	5937	5937	---	1921	1921	0.0064	38	12	50
2077	---	5937	5937	---	1921	1921	0.0060	35	11	47
<hr/>										
Years of Analysis										
Annualization Factor										
Annualized Capacity Credit (2000)										
Annualized Capacity Credit (2005)										
Annualized Capacity Credit (2010)										
Annualized Capacity Credit (2015)										
191714										
90289										
282004										
77										
0.06916										
0.06916										
0.06916										
13260										
6245										
19505										
13260										
6998										
13260										
9751										
23011										
13260										
11121										
24381										

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (9): Column (4) X Column (8).

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (10): Column (7) X Column (8).

TABLE 7-1b
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 10.0 MGD WITHDRAWAL FROM LAUREL PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	192420	66990	192420	85820	19213	85820	----	----	----	----
2001	192420	66990	192420	85820	19213	85820	0.9357	180042	80299	260341
2002	192420	66990	192420	85820	19213	85820	0.8755	168460	75134	243594
2003	192420	66990	192420	85820	19213	85820	0.8192	157624	70301	227924
2004	192420	66990	192420	85820	19213	85820	0.7665	147484	65779	213263
2005	192420	66990	192420	85820	19213	85820	0.7172	137997	61547	199544
2006	192420	66990	192420	85820	19213	85820	0.6710	129120	57588	186708
2007	192420	66990	192420	85820	19213	85820	0.6279	120814	53883	174697
2008	192420	66990	192420	85820	19213	85820	0.5875	113042	50417	163459
2009	192420	66990	192420	85820	19213	85820	0.5497	105770	47174	152945
2010	192420	66990	192420	85820	19213	85820	0.5143	98966	44139	143106
2011	192420	66990	192420	85820	19213	85820	0.4812	92600	41300	133900
2012	192420	66990	192420	85820	19213	85820	0.4503	86643	38643	125287
2013	192420	66990	192420	85820	19213	85820	0.4213	81070	36158	117227
2014	192420	66990	192420	85820	19213	85820	0.3942	75855	33832	109687
2015	192420	66990	192420	85820	19213	85820	0.3689	70975	31655	102631
2016	192420	66990	192420	85820	19213	85820	0.3451	66410	29619	96029
2017	---	66990	----	19213	19213	0.3229	21633	6204	27837	
2018	---	66990	66990	----	19213	19213	0.3022	20241	5805	26047
2019	---	66990	66990	----	19213	19213	0.2827	18939	5432	24371
2020	---	66990	66990	----	19213	19213	0.2645	17721	5082	22803
2021	---	66990	66990	----	19213	19213	0.2475	16581	4755	21337
2022	---	66990	66990	----	19213	19213	0.2316	15514	4450	19964
2023	---	66990	66990	----	19213	19213	0.2167	14516	4163	18680
2024	---	66990	66990	----	19213	19213	0.2028	13583	3896	17478
2025-2069	---	66990	66990	----	19213	19213	2.8012	187651	53818	241470
2070	---	66990	66990	----	19213	19213	0.0095	638	183	821
2071	---	66990	66990	----	19213	19213	0.0089	597	171	768
2072	---	66990	66990	----	19213	19213	0.0083	558	160	719
2073	---	66990	66990	----	19213	19213	0.0078	522	150	672
2074	---	66990	66990	----	19213	19213	0.0073	489	140	629
2075	---	66990	66990	----	19213	19213	0.0068	457	131	589
2076	---	66990	66990	----	19213	19213	0.0064	428	123	551
2077	---	66990	66990	----	19213	19213	0.0060	400	115	515
<hr/>										
Years of Analysis										
Annualization Factor										
Annualized Capacity Credit (2000)										
Annualized Capacity Credit (2005)										
Annualized Capacity Credit (2010)										
Annualized Capacity Credit (2015)										

2163344										
912248										
3075592										

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (9): Column (4) X Column (8).

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (10): Column (7) X Column (8).

TABLE 7-2a
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 1.0 MGD WITHDRAWAL FROM WOLF CREEK PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	3230	1125	3230	4488	1148	4488	----	----	----	----
2001	3230	1125	3230	4488	1148	4488	0.9357	3023	4199	7222
2002	3230	1125	3230	4488	1148	4488	0.8755	2828	3929	6757
2003	3230	1125	3230	4488	1148	4488	0.8192	2646	3676	6323
2004	3230	1125	3230	4488	1148	4488	0.7665	2476	3440	5916
2005	3230	1125	3230	4488	1148	4488	0.7172	2317	3219	5535
2006	3230	1125	3230	4488	1148	4488	0.6710	2168	3012	5179
2007	3230	1125	3230	4488	1148	4488	0.6279	2028	2818	4846
2008	3230	1125	3230	4488	1148	4488	0.5875	1898	2637	4534
2009	3230	1125	3230	4488	1148	4488	0.5497	1776	2467	4243
2010	3230	1125	3230	4488	1148	4488	0.5143	1661	2308	3970
2011	3230	1125	3230	4488	1148	4488	0.4812	1555	2160	3714
2012	3230	1125	3230	4488	1148	4488	0.4503	1455	2021	3475
2013	3230	1125	3230	4488	1148	4488	0.4213	1361	1891	3252
2014	3230	1125	3230	4488	1148	4488	0.3942	1273	1769	3043
2015	3230	1125	3230	4488	1148	4488	0.3689	1192	1655	2847
2016	3230	1125	3230	4488	1148	4488	0.3451	1115	1549	2664
2017	---	1125	1125	---	1148	1148	0.3229	363	371	734
2018	---	1125	1125	---	1148	1148	0.3022	340	347	687
2019	---	1125	1125	---	1148	1148	0.2827	318	324	642
2020	---	1125	1125	---	1148	1148	0.2645	298	304	601
2021	---	1125	1125	---	1148	1148	0.2475	278	284	562
2022	---	1125	1125	---	1148	1148	0.2316	260	266	526
2023	---	1125	1125	---	1148	1148	0.2167	244	249	492
2024	---	1125	1125	---	1148	1148	0.2028	228	233	461
2025-2044	---	1125	1125	---	1148	1148	2.1690	2439	2489	4928
2045	---	1125	1125	---	1148	1148	0.0502	56	58	114
2046	---	1125	1125	---	1148	1148	0.0470	53	54	107
2047	---	1125	1125	---	1148	1148	0.0439	49	50	100
2048	---	1125	1125	---	1148	1148	0.0411	46	47	93
2049	---	1125	1125	---	1148	1148	0.0385	43	44	87
2050	---	1125	1125	---	1148	1148	0.0360	40	41	82
2051	---	1125	1125	---	1148	1148	0.0337	38	39	77
2052	---	1125	1125	---	1148	1148	0.0315	35	36	72
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Years of Analysis										
Annualization Factor										
Annualized Capacity Credit (2000)										
Annualized Capacity Credit (2005)										
Annualized Capacity Credit (2010)										
Annualized Capacity Credit (2015)										
35901										
47985										
83886										
52										
52										
52										
0.07099										
0.07099										
0.07099										
2548										
3406										
5954										
2548										
3846										
2548										
5112										
7660										
2548										
5935										
8483										

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (9): Column (4) X Column (8).

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-2b
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 10.0 MGD WITHDRAWAL FROM WOLF CREEK PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	32268	11234	32268	44876	11478	44876	----	----	----	----
2001	32268	11234	32268	44876	11478	44876	0.9357	30193	41989	72182
2002	32268	11234	32268	44876	11478	44876	0.8755	28250	39288	67538
2003	32268	11234	32268	44876	11478	44876	0.8192	26433	36761	63194
2004	32268	11234	32268	44876	11478	44876	0.7665	24733	34396	59129
2005	32268	11234	32268	44876	11478	44876	0.7172	23142	32184	55325
2006	32268	11234	32268	44876	11478	44876	0.6710	21653	30113	51766
2007	32268	11234	32268	44876	11478	44876	0.6279	20260	28176	48436
2008	32268	11234	32268	44876	11478	44876	0.5875	18957	26364	45320
2009	32268	11234	32268	44876	11478	44876	0.5497	17737	24668	42405
2010	32268	11234	32268	44876	11478	44876	0.5143	16596	23081	39677
2011	32268	11234	32268	44876	11478	44876	0.4812	15529	21596	37125
2012	32268	11234	32268	44876	11478	44876	0.4503	14530	20207	34737
2013	32268	11234	32268	44876	11478	44876	0.4213	13595	18907	32502
2014	32268	11234	32268	44876	11478	44876	0.3942	12721	17691	30411
2015	32268	11234	32268	44876	11478	44876	0.3689	11902	16553	28455
2016	32268	11234	32268	44876	11478	44876	0.3451	11137	15488	26625
2017	---	11234	11234	----	11478	11478	0.3229	3628	3707	7334
2018	---	11234	11234	----	11478	11478	0.3022	3394	3468	6863
2019	---	11234	11234	----	11478	11478	0.2827	3176	3245	6421
2020	---	11234	11234	----	11478	11478	0.2645	2972	3036	6008
2021	---	11234	11234	----	11478	11478	0.2475	2781	2841	5622
2022	---	11234	11234	----	11478	11478	0.2316	2602	2658	5260
2023	---	11234	11234	----	11478	11478	0.2167	2434	2487	4922
2024	---	11234	11234	----	11478	11478	0.2028	2278	2327	4605
2025-2044	---	11234	11234	----	11478	11478	0.1690	24367	24896	49263
2045	---	11234	11234	----	11478	11478	0.0502	564	576	1140
2046	---	11234	11234	----	11478	11478	0.0470	528	539	1066
2047	---	11234	11234	----	11478	11478	0.0439	494	504	998
2048	---	11234	11234	----	11478	11478	0.0411	462	472	934
2049	---	11234	11234	----	11478	11478	0.0385	432	442	874
2050	---	11234	11234	----	11478	11478	0.0360	404	413	817
2051	---	11234	11234	----	11478	11478	0.0337	378	387	765
2052	---	11234	11234	----	11478	11478	0.0315	354	362	716
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Years of Analysis										
Annualization Factor										
Annualized Capacity Credit (2000)										
Annualized Capacity Credit (2005)										
Annualized Capacity Credit (2010)										
Annualized Capacity Credit (2015)										
358615										
479821										
838436										
52										
52										
52										
0.07099										
0.07099										
0.07099										
25457										
34061										
59518										
25457										
38469										
63926										
51211										
76668										
25457										
59562										
85019										

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (9): Column (4) X Column (8).

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (10): Column (7) X Column (8).

TABLE 7-3a
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 1.0 MGD WITHDRAWAL FROM CORDELL HULL PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	1012	352	1012	1445	374	1445	---	---	---	---
2001	1012	352	1012	1445	374	1445	0.9357	946	1352	2299
2002	1012	352	1012	1445	374	1445	0.8755	886	1265	2151
2003	1012	352	1012	1445	374	1445	0.8192	829	1184	2012
2004	1012	352	1012	1445	374	1445	0.7665	775	1108	1883
2005	1012	352	1012	1445	374	1445	0.7172	725	1036	1762
2006	1012	352	1012	1445	374	1445	0.6710	679	970	1648
2007	1012	352	1012	1445	374	1445	0.6279	635	907	1542
2008	1012	352	1012	1445	374	1445	0.5875	594	849	1443
2009	1012	352	1012	1445	374	1445	0.5497	556	794	1350
2010	1012	352	1012	1445	374	1445	0.5143	520	743	1263
2011	1012	352	1012	1445	374	1445	0.4812	487	695	1182
2012	1012	352	1012	1445	374	1445	0.4503	455	651	1106
2013	1012	352	1012	1445	374	1445	0.4213	426	609	1035
2014	1012	352	1012	1445	374	1445	0.3942	399	570	968
2015	1012	352	1012	1445	374	1445	0.3689	373	533	906
2016	1012	352	1012	1445	374	1445	0.3451	349	499	848
2017	---	352	352	---	374	374	0.3229	114	121	235
2018	---	352	352	---	374	374	0.3022	106	113	219
2019	---	352	352	---	374	374	0.2827	100	106	205
2020	---	352	352	---	374	374	0.2645	93	99	192
2021	---	352	352	---	374	374	0.2475	87	93	180
2022	---	352	352	---	374	374	0.2316	82	87	168
2023	---	352	352	---	374	374	0.2167	76	81	157
2024	---	352	352	---	374	374	0.2028	71	76	147
2025-2066	---	352	352	---	374	374	2.7685	975	1036	2011
2067	---	352	352	---	374	374	0.0116	4	4	8
2068	---	352	352	---	374	374	0.0109	4	4	8
2069	---	352	352	---	374	374	0.0102	4	4	7
2070	---	352	352	---	374	374	0.0095	3	4	7
2071	---	352	352	---	374	374	0.0089	3	3	6
2072	---	352	352	---	374	374	0.0083	3	3	6
2073	---	352	352	---	374	374	0.0078	3	3	6
2074	---	352	352	---	374	374	0.0073	3	3	5
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Years of Analysis										
Annualization Factor										
Annualized Capacity Credit (2000)										
Annualized Capacity Credit (2005)										
Annualized Capacity Credit (2010)										
Annualized Capacity Credit (2015)										
11366										
74										
74										
74										
0.06926										
0.06926										
0.06926										
787										
1081										
1868										
787										
1219										
787										
1610										
2397										
787										
1855										
2642										

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-3b
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 10.0 MGD WITHDRAWAL FROM CORDELL HULL PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	10105	3518	10105	14434	3743	14434	----	----	----	----
2001	10105	3518	10105	14434	3743	14434	0.9357	9455	13505	22961
2002	10105	3518	10105	14434	3743	14434	0.8755	8847	12637	21484
2003	10105	3518	10105	14434	3743	14434	0.8192	8278	11824	20102
2004	10105	3518	10105	14434	3743	14434	0.7665	7746	11063	18809
2005	10105	3518	10105	14434	3743	14434	0.7172	7247	10352	17599
2006	10105	3518	10105	14434	3743	14434	0.6710	6781	9686	16467
2007	10105	3518	10105	14434	3743	14434	0.6279	6345	9063	15407
2008	10105	3518	10105	14434	3743	14434	0.5875	5937	8480	14416
2009	10105	3518	10105	14434	3743	14434	0.5497	5555	7934	13489
2010	10105	3518	10105	14434	3743	14434	0.5143	5197	7424	12621
2011	10105	3518	10105	14434	3743	14434	0.4812	4863	6946	11809
2012	10105	3518	10105	14434	3743	14434	0.4503	4550	6499	11050
2013	10105	3518	10105	14434	3743	14434	0.4213	4258	6081	10339
2014	10105	3518	10105	14434	3743	14434	0.3942	3984	5690	9674
2015	10105	3518	10105	14434	3743	14434	0.3689	3727	5324	9052
2016	10105	3518	10105	14434	3743	14434	0.3451	3488	4982	8469
2017	---	3518	---	3743	3743	0.3229	1136	1209	2345	
2018	---	3518	3518	---	3743	3743	0.3022	1063	1131	2194
2019	---	3518	3518	---	3743	3743	0.2827	995	1058	2053
2020	---	3518	3518	---	3743	3743	0.2645	931	990	1921
2021	---	3518	3518	---	3743	3743	0.2475	871	926	1797
2022	---	3518	3518	---	3743	3743	0.2316	815	867	1682
2023	---	3518	3518	---	3743	3743	0.2167	762	811	1573
2024	---	3518	3518	---	3743	3743	0.2028	713	759	1472
2025-2066	---	3518	3518	---	3743	3743	0.27685	9740	10362	20102
2067	---	3518	3518	---	3743	3743	0.0116	41	43	84
2068	---	3518	3518	---	3743	3743	0.0109	38	41	79
2069	---	3518	3518	---	3743	3743	0.0102	36	38	74
2070	---	3518	3518	---	3743	3743	0.0095	33	36	69
2071	---	3518	3518	---	3743	3743	0.0089	31	33	65
2072	---	3518	3518	---	3743	3743	0.0083	29	31	61
2073	---	3518	3518	---	3743	3743	0.0078	27	29	57
2074	---	3518	3518	---	3743	3743	0.0073	26	27	53
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Years of Analysis										
Annualization Factor										
Annualized Capacity Credit (2000)										
Annualized Capacity Credit (2005)										
Annualized Capacity Credit (2010)										
Annualized Capacity Credit (2015)										

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-4a
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 1.0 MGD WITHDRAWAL FROM OLD HICKORY PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	802	279	802	1418	380	1418	----	----	----	----
2001	802	279	802	1418	380	1418	0.9357	750	1327	2077
2002	802	279	802	1418	380	1418	0.8755	702	1241	1943
2003	802	279	802	1418	380	1418	0.8192	657	1162	1818
2004	802	279	802	1418	380	1418	0.7665	614	1087	1701
2005	802	279	802	1418	380	1418	0.7172	575	1017	1592
2006	802	279	802	1418	380	1418	0.6710	538	952	1489
2007	802	279	802	1418	380	1418	0.6279	503	890	1394
2008	802	279	802	1418	380	1418	0.5875	471	833	1304
2009	802	279	802	1418	380	1418	0.5497	441	779	1220
2010	802	279	802	1418	380	1418	0.5143	412	729	1142
2011	802	279	802	1418	380	1418	0.4812	386	682	1068
2012	802	279	802	1418	380	1418	0.4503	361	639	999
2013	802	279	802	1418	380	1418	0.4213	338	597	935
2014	802	279	802	1418	380	1418	0.3942	316	559	875
2015	802	279	802	1418	380	1418	0.3689	296	523	819
2016	802	279	802	1418	380	1418	0.3451	277	489	766
2017	---	279	279	---	380	380	0.3229	90	123	213
2018	---	279	279	---	380	380	0.3022	84	115	199
2019	---	279	279	---	380	380	0.2827	79	108	186
2020	---	279	279	---	380	380	0.2645	74	101	174
2021	---	279	279	---	380	380	0.2475	69	94	163
2022	---	279	279	---	380	380	0.2316	65	88	153
2023	---	279	279	---	380	380	0.2167	60	82	143
2024	---	279	279	---	380	380	0.2028	57	77	134
2025-2048	---	279	279	---	380	380	2.3512	656	894	1550
2049	---	279	279	---	380	380	0.0385	11	15	25
2050	---	279	279	---	380	380	0.0360	10	14	24
2051	---	279	279	---	380	380	0.0337	9	13	22
2052	---	279	279	---	380	380	0.0315	9	12	21
2053	---	279	279	---	380	380	0.0295	8	11	19
2054	---	279	279	---	380	380	0.0276	8	10	18
2055	---	279	279	---	380	380	0.0258	7	10	17
2056	---	279	279	---	380	380	0.0242	7	9	16
2057	---	279	279	---	380	380	0.0226	6	9	15
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Years of Analysis										
Annualization Factor										
Annualized Capacity Credit (2000)										
Annualized Capacity Credit (2005)										
Annualized Capacity Credit (2010)										
Annualized Capacity Credit (2015)										

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-4b
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 10.0 MGD WITHDRAWAL FROM OLD HICKORY PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	8006	2787	8006	14176	3803	14176	----	----	----	----
2001	8006	2787	8006	14176	3803	14176	0.9357	7491	13264	20755
2002	8006	2787	8006	14176	3803	14176	0.8755	7009	12411	19420
2003	8006	2787	8006	14176	3803	14176	0.8192	6558	11612	18171
2004	8006	2787	8006	14176	3803	14176	0.7665	6137	10865	17002
2005	8006	2787	8006	14176	3803	14176	0.7172	5742	10167	15908
2006	8006	2787	8006	14176	3803	14176	0.6710	5372	9513	14885
2007	8006	2787	8006	14176	3803	14176	0.6279	5027	8901	13927
2008	8006	2787	8006	14176	3803	14176	0.5875	4703	8328	13032
2009	8006	2787	8006	14176	3803	14176	0.5497	4401	7792	12193
2010	8006	2787	8006	14176	3803	14176	0.5143	4118	7291	11409
2011	8006	2787	8006	14176	3803	14176	0.4812	3853	6822	10675
2012	8006	2787	8006	14176	3803	14176	0.4503	3605	6383	9988
2013	8006	2787	8006	14176	3803	14176	0.4213	3373	5973	9346
2014	8006	2787	8006	14176	3803	14176	0.3942	3156	5588	8745
2015	8006	2787	8006	14176	3803	14176	0.3689	2953	5229	8182
2016	8006	2787	8006	14176	3803	14176	0.3451	2763	4893	7656
2017	---	2787	---	3803	3803	0.3229	900	1228	2128	
2018	---	2787	2787	3803	3803	0.3022	842	1149	1991	
2019	---	2787	2787	3803	3803	0.2827	788	1075	1863	
2020	---	2787	2787	3803	3803	0.2645	737	1006	1743	
2021	---	2787	2787	3803	3803	0.2475	690	941	1631	
2022	---	2787	2787	3803	3803	0.2316	646	881	1526	
2023	---	2787	2787	3803	3803	0.2167	604	824	1428	
2024	---	2787	2787	3803	3803	0.2028	565	771	1336	
2025-2048	---	2787	2787	3803	3803	2.3512	6554	8942	15496	
2049	---	2787	2787	3803	3803	0.0385	107	146	254	
2050	---	2787	2787	3803	3803	0.0360	100	137	237	
2051	---	2787	2787	3803	3803	0.0337	94	128	222	
2052	---	2787	2787	3803	3803	0.0315	88	120	208	
2053	---	2787	2787	3803	3803	0.0295	82	112	194	
2054	---	2787	2787	3803	3803	0.0276	77	105	182	
2055	---	2787	2787	3803	3803	0.0258	72	98	170	
2056	---	2787	2787	3803	3803	0.0242	67	92	159	
2057	---	2787	2787	3803	3803	0.0226	63	86	149	
<hr/>										
Years of Analysis										
Annualization Factor										
Annualized Capacity Credit (2000)										
Annualized Capacity Credit (2005)										
Annualized Capacity Credit (2010)										
Annualized Capacity Credit (2015)										

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are

based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-5a
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 1.0 MGD WITHDRAWAL FROM CHEATHAM PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	337	117	337	591	161	591	---	---	---	---
2001	337	117	337	591	161	591	0.9357	316	553	869
2002	337	117	337	591	161	591	0.8755	295	517	813
2003	337	117	337	591	161	591	0.8192	276	484	760
2004	337	117	337	591	161	591	0.7665	258	453	711
2005	337	117	337	591	161	591	0.7172	242	424	666
2006	337	117	337	591	161	591	0.6710	226	397	623
2007	337	117	337	591	161	591	0.6279	212	371	583
2008	337	117	337	591	161	591	0.5875	198	347	545
2009	337	117	337	591	161	591	0.5497	185	325	510
2010	337	117	337	591	161	591	0.5143	173	304	477
2011	337	117	337	591	161	591	0.4812	162	284	447
2012	337	117	337	591	161	591	0.4503	152	266	418
2013	337	117	337	591	161	591	0.4213	142	249	391
2014	337	117	337	591	161	591	0.3942	133	233	366
2015	337	117	337	591	161	591	0.3689	124	218	342
2016	337	117	337	591	161	591	0.3451	116	204	320
2017	---	117	117	---	161	161	0.3229	38	52	90
2018	---	117	117	---	161	161	0.3022	35	49	84
2019	---	117	117	---	161	161	0.2827	33	46	79
2020	---	117	117	---	161	161	0.2645	31	43	74
2021	---	117	117	---	161	161	0.2475	29	40	69
2022	---	117	117	---	161	161	0.2316	27	37	65
2023	---	117	117	---	161	161	0.2167	25	35	60
2024	---	117	117	---	161	161	0.2028	24	33	57
2025-2050	---	117	117	---	161	161	2.3512	276	379	655
2051	---	117	117	---	161	161	0.0337	4	5	9
2052	---	117	117	---	161	161	0.0315	4	5	9
2053	---	117	117	---	161	161	0.0295	3	5	8
2054	---	117	117	---	161	161	0.0276	3	4	8
2055	---	117	117	---	161	161	0.0258	3	4	7
2056	---	117	117	---	161	161	0.0242	3	4	7
2057	---	117	117	---	161	161	0.0226	3	4	6
2058	---	117	117	---	161	161	0.0211	2	3	6
										3766
										6390
										10156
Years of Analysis										58
Annualization Factor										0.07024
Annualized Capacity Credit (2000)										713
Annualized Capacity Credit (2005)										264
Annualized Capacity Credit (2010)										264
Annualized Capacity Credit (2015)										264
										502
										766
										640
										904
										698
										962

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-5b
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 10.0 MGD WITHDRAWAL FROM CHEATHAM PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	3368	1173	3368	5907	1614	5907	----	----	----	----
2001	3368	1173	3368	5907	1614	5907	0.9357	3151	5527	8678
2002	3368	1173	3368	5907	1614	5907	0.8755	2949	5171	8120
2003	3368	1173	3368	5907	1614	5907	0.8192	2759	4839	7598
2004	3368	1173	3368	5907	1614	5907	0.7665	2581	4528	7109
2005	3368	1173	3368	5907	1614	5907	0.7172	2415	4236	6652
2006	3368	1173	3368	5907	1614	5907	0.6710	2260	3964	6224
2007	3368	1173	3368	5907	1614	5907	0.6279	2115	3709	5823
2008	3368	1173	3368	5907	1614	5907	0.5875	1979	3470	5449
2009	3368	1173	3368	5907	1614	5907	0.5497	1851	3247	5098
2010	3368	1173	3368	5907	1614	5907	0.5143	1732	3038	4770
2011	3368	1173	3368	5907	1614	5907	0.4812	1621	2843	4464
2012	3368	1173	3368	5907	1614	5907	0.4503	1517	2660	4176
2013	3368	1173	3368	5907	1614	5907	0.4213	1419	2489	3908
2014	3368	1173	3368	5907	1614	5907	0.3942	1328	2329	3656
2015	3368	1173	3368	5907	1614	5907	0.3689	1242	2179	3421
2016	3368	1173	3368	5907	1614	5907	0.3451	1162	2039	3201
2017	---	1173	1173	----	1614	1614	0.3229	379	521	900
2018	---	1173	1173	----	1614	1614	0.3022	354	488	842
2019	---	1173	1173	----	1614	1614	0.2827	332	456	788
2020	---	1173	1173	----	1614	1614	0.2645	310	427	737
2021	---	1173	1173	----	1614	1614	0.2475	290	399	690
2022	---	1173	1173	----	1614	1614	0.2316	272	374	645
2023	---	1173	1173	----	1614	1614	0.2167	254	350	604
2024	---	1173	1173	----	1614	1614	0.2028	238	327	565
2025-2050	---	1173	1173	----	1614	1614	2.4257	2844	3914	6759
2051	---	1173	1173	----	1614	1614	0.0337	39	54	94
2052	---	1173	1173	----	1614	1614	0.0315	37	51	88
2053	---	1173	1173	----	1614	1614	0.0295	35	48	82
2054	---	1173	1173	----	1614	1614	0.0276	32	45	77
2055	---	1173	1173	----	1614	1614	0.0258	30	42	72
2056	---	1173	1173	----	1614	1614	0.0242	28	39	67
2057	---	1173	1173	----	1614	1614	0.0226	26	36	63
2058	---	1173	1173	----	1614	1614	0.0211	25	34	59
								37607	63871	101478
Years of Analysis								58	58	58
Annualization Factor								0.07024	0.07024	0.07024
Annualized Capacity Credit (2000)								2641	4486	7127
Annualized Capacity Credit (2005)								2641	5011	7652
Annualized Capacity Credit (2010)								2641	6356	8997
Annualized Capacity Credit (2015)								2641	6982	9623

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are

COLUMN (9): Column (4) X Column (8).

based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (10): Column (7) X Column (8).

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (11): Column (9) + Column (10).

TABLE 7-6a
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 1.0 MGD WITHDRAWAL FROM BARKLEY PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	439	153	439	1140	312	1140	----	----	----	----
2001	439	153	439	1140	312	1140	0.9357	411	1067	1477
2002	439	153	439	1140	312	1140	0.8755	384	998	1382
2003	439	153	439	1140	312	1140	0.8192	359	934	1293
2004	439	153	439	1140	312	1140	0.7665	336	874	1210
2005	439	153	439	1140	312	1140	0.7172	315	818	1132
2006	439	153	439	1140	312	1140	0.6710	294	765	1059
2007	439	153	439	1140	312	1140	0.6279	276	716	991
2008	439	153	439	1140	312	1140	0.5875	258	670	928
2009	439	153	439	1140	312	1140	0.5497	241	627	868
2010	439	153	439	1140	312	1140	0.5143	226	586	812
2011	439	153	439	1140	312	1140	0.4812	211	549	760
2012	439	153	439	1140	312	1140	0.4503	198	513	711
2013	439	153	439	1140	312	1140	0.4213	185	480	665
2014	439	153	439	1140	312	1140	0.3942	173	449	622
2015	439	153	439	1140	312	1140	0.3689	162	420	582
2016	439	153	439	1140	312	1140	0.3451	151	393	545
2017	---	153	153	---	312	312	0.3229	49	101	150
2018	---	153	153	---	312	312	0.3022	46	94	140
2019	---	153	153	---	312	312	0.2827	43	88	131
2020	---	153	153	---	312	312	0.2645	40	82	123
2021	---	153	153	---	312	312	0.2475	38	77	115
2022	---	153	153	---	312	312	0.2316	35	72	108
2023	---	153	153	---	312	312	0.2167	33	68	101
2024	---	153	153	---	312	312	0.2028	31	63	94
2025-2058	---	153	153	---	312	312	2.6416	404	823	1226
2059	---	153	153	---	312	312	0.0198	3	6	9
2060	---	153	153	---	312	312	0.0185	3	6	9
2061	---	153	153	---	312	312	0.0173	3	5	8
2062	---	153	153	---	312	312	0.0162	2	5	8
2063	---	153	153	---	312	312	0.0152	2	5	7
2064	---	153	153	---	312	312	0.0142	2	4	7
2065	---	153	153	---	312	312	0.0133	2	4	6
2066	---	153	153	---	312	312	0.0124	2	4	6
								4919	12366	17285
Years of Analysis								66	66	66
Annualization Factor								0.06961	0.06961	0.06961
Annualized Capacity Credit (2000)								342	861	1203
Annualized Capacity Credit (2005)								342	952	1294
Annualized Capacity Credit (2010)								342	1222	1564
Annualized Capacity Credit (2015)								342	1392	1734

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-6b
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 10.0 MGD WITHDRAWAL FROM BARKLEY PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	4384	1526	4384	11401	3116	11401	----	----	----	----
2001	4384	1526	4384	11401	3116	11401	0.9357	4102	10668	14770
2002	4384	1526	4384	11401	3116	11401	0.8755	3839	9981	13820
2003	4384	1526	4384	11401	3116	11401	0.8192	3592	9339	12931
2004	4384	1526	4384	11401	3116	11401	0.7665	3361	8739	12099
2005	4384	1526	4384	11401	3116	11401	0.7172	3144	8176	11321
2006	4384	1526	4384	11401	3116	11401	0.6710	2942	7650	10593
2007	4384	1526	4384	11401	3116	11401	0.6279	2753	7158	9911
2008	4384	1526	4384	11401	3116	11401	0.5875	2576	6698	9274
2009	4384	1526	4384	11401	3116	11401	0.5497	2410	6267	8677
2010	4384	1526	4384	11401	3116	11401	0.5143	2255	5864	8119
2011	4384	1526	4384	11401	3116	11401	0.4812	2110	5487	7597
2012	4384	1526	4384	11401	3116	11401	0.4503	1974	5134	7108
2013	4384	1526	4384	11401	3116	11401	0.4213	1847	4803	6651
2014	4384	1526	4384	11401	3116	11401	0.3942	1728	4494	6223
2015	4384	1526	4384	11401	3116	11401	0.3689	1617	4205	5823
2016	4384	1526	4384	11401	3116	11401	0.3451	1513	3935	5448
2017	---	1526	----	3116	3116	0.3229	493	1006	1499	
2018	---	1526	1526	3116	3116	0.3022	461	941	1403	
2019	---	1526	1526	3116	3116	0.2827	432	881	1312	
2020	---	1526	1526	3116	3116	0.2645	404	824	1228	
2021	---	1526	1526	3116	3116	0.2475	378	771	1149	
2022	---	1526	1526	3116	3116	0.2316	354	722	1075	
2023	---	1526	1526	3116	3116	0.2167	331	675	1006	
2024	---	1526	1526	3116	3116	0.2028	309	632	941	
2025-2058	---	1526	1526	3116	3116	2.6416	4032	8230	12263	
2059	---	1526	1526	3116	3116	0.0198	30	62	92	
2060	---	1526	1526	3116	3116	0.0185	28	58	86	
2061	---	1526	1526	3116	3116	0.0173	26	54	80	
2062	---	1526	1526	3116	3116	0.0162	25	50	75	
2063	---	1526	1526	3116	3116	0.0152	23	47	70	
2064	---	1526	1526	3116	3116	0.0142	22	44	66	
2065	---	1526	1526	3116	3116	0.0133	20	41	62	
2066	---	1526	1526	3116	3116	0.0124	19	39	58	
<hr/>										<hr/>
										49151
										123677
										172828
<hr/>										<hr/>
										<hr/>
Years of Analysis										66
Annualization Factor										0.06961
Annualized Capacity Credit (2000)										3422
Annualized Capacity Credit (2005)										3422
Annualized Capacity Credit (2010)										3422
Annualized Capacity Credit (2015)										3422
<hr/>										<hr/>

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (9): Column (4) X Column (8).

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-7a
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 1.0 MGD WITHDRAWAL FROM DALE HOLLOW PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	4223	1470	4223	3869	956	3869	----	----	----	----
2001	4223	1470	4223	3869	956	3869	0.9357	3952	3620	7572
2002	4223	1470	4223	3869	956	3869	0.8755	3697	3387	7085
2003	4223	1470	4223	3869	956	3869	0.8192	3460	3169	6629
2004	4223	1470	4223	3869	956	3869	0.7665	3237	2965	6203
2005	4223	1470	4223	3869	956	3869	0.7172	3029	2775	5804
2006	4223	1470	4223	3869	956	3869	0.6710	2834	2596	5430
2007	4223	1470	4223	3869	956	3869	0.6279	2652	2429	5081
2008	4223	1470	4223	3869	956	3869	0.5875	2481	2273	4754
2009	4223	1470	4223	3869	956	3869	0.5497	2322	2127	4448
2010	4223	1470	4223	3869	956	3869	0.5143	2172	1990	4162
2011	4223	1470	4223	3869	956	3869	0.4812	2032	1862	3894
2012	4223	1470	4223	3869	956	3869	0.4503	1902	1742	3644
2013	4223	1470	4223	3869	956	3869	0.4213	1779	1630	3409
2014	4223	1470	4223	3869	956	3869	0.3942	1665	1525	3190
2015	4223	1470	4223	3869	956	3869	0.3689	1558	1427	2985
2016	4223	1470	4223	3869	956	3869	0.3451	1458	1335	2793
2017	---	1470	1470	---	956	956	0.3229	475	309	783
2018	---	1470	1470	---	956	956	0.3022	444	289	733
2019	---	1470	1470	---	956	956	0.2827	416	270	686
2020	---	1470	1470	---	956	956	0.2645	389	253	642
2021	---	1470	1470	---	956	956	0.2475	364	237	600
2022	---	1470	1470	---	956	956	0.2316	341	221	562
2023	---	1470	1470	---	956	956	0.2167	319	207	526
2024	---	1470	1470	---	956	956	0.2028	298	194	492
2025-2041	---	1470	1470	---	956	956	1.9968	2936	1908	4844
2042	---	1470	1470	---	956	956	0.0613	90	59	149
2043	---	1470	1470	---	956	956	0.0573	84	55	139
2044	---	1470	1470	---	956	956	0.0536	79	51	130
2045	---	1470	1470	---	956	956	0.0502	74	48	122
2046	---	1470	1470	---	956	956	0.0470	69	45	114
2047	---	1470	1470	---	956	956	0.0439	65	42	107
2048	---	1470	1470	---	956	956	0.0411	60	39	100
2049	---	1470	1470	---	956	956	0.0385	57	37	93
								46788	41117	87904
Years of Analysis								49	49	49
Annualization Factor								0.07150	0.07150	0.07150
Annualized Capacity Credit (2000)								3345	2940	6285
Annualized Capacity Credit (2005)								3345	3336	6681
Annualized Capacity Credit (2010)								3345	4516	7861
Annualized Capacity Credit (2015)								3345	5062	8407

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-7b
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 10.0 MGD WITHDRAWAL FROM DALE HOLLOW PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	42190	14688	42190	38436	9559	38436	----	----	----	----
2001	42190	14688	42190	38436	9559	38436	0.9357	39476	35964	75440
2002	42190	14688	42190	38436	9559	38436	0.8755	36937	33650	70587
2003	42190	14688	42190	38436	9559	38436	0.8192	34561	31485	66046
2004	42190	14688	42190	38436	9559	38436	0.7665	32338	29460	61798
2005	42190	14688	42190	38436	9559	38436	0.7172	30257	27565	57822
2006	42190	14688	42190	38436	9559	38436	0.6710	28311	25792	54103
2007	42190	14688	42190	38436	9559	38436	0.6279	26490	24133	50622
2008	42190	14688	42190	38436	9559	38436	0.5875	24786	22580	47366
2009	42190	14688	42190	38436	9559	38436	0.5497	23191	21128	44319
2010	42190	14688	42190	38436	9559	38436	0.5143	21700	19769	41468
2011	42190	14688	42190	38436	9559	38436	0.4812	20304	18497	38801
2012	42190	14688	42190	38436	9559	38436	0.4503	18998	17307	36305
2013	42190	14688	42190	38436	9559	38436	0.4213	17775	16194	33969
2014	42190	14688	42190	38436	9559	38436	0.3942	16632	15152	31784
2015	42190	14688	42190	38436	9559	38436	0.3689	15562	14177	29740
2016	42190	14688	42190	38436	9559	38436	0.3451	14561	13265	27826
2017	---	14688	----	9559	9559	0.3229	4743	3087	7830	
2018	---	14688	14688	----	9559	9559	0.3022	4438	2888	7327
2019	---	14688	14688	----	9559	9559	0.2827	4153	2703	6855
2020	---	14688	14688	----	9559	9559	0.2645	3886	2529	6414
2021	---	14688	14688	----	9559	9559	0.2475	3636	2366	6002
2022	---	14688	14688	----	9559	9559	0.2316	3402	2214	5616
2023	---	14688	14688	----	9559	9559	0.2167	3183	2071	5254
2024	---	14688	14688	----	9559	9559	0.2028	2978	1938	4916
2025-2041	---	14688	14688	----	9559	9559	1.9968	29330	19088	48417
2042	---	14688	14688	----	9559	9559	0.0613	900	586	1485
2043	---	14688	14688	----	9559	9559	0.0573	842	548	1390
2044	---	14688	14688	----	9559	9559	0.0536	788	513	1301
2045	---	14688	14688	----	9559	9559	0.0502	737	480	1217
2046	---	14688	14688	----	9559	9559	0.0470	690	449	1139
2047	---	14688	14688	----	9559	9559	0.0439	645	420	1065
2048	---	14688	14688	----	9559	9559	0.0411	604	393	997
2049	---	14688	14688	----	9559	9559	0.0385	565	368	933
							467396	408757	876153	
Years of Analysis								49	49	49
Annualization Factor								0.07150	0.07150	0.07150
Annualized Capacity Credit (2000)								33419	29226	62645
Annualized Capacity Credit (2005)								33419	33129	66548
Annualized Capacity Credit (2010)								33419	44944	78363
Annualized Capacity Credit (2015)								33419	50249	83668

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are

COLUMN (9): Column (4) X Column (8).

based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (10): Column (7) X Column (8).

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (11): Column (9) + Column (10).

TABLE 7-8a
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 1.0 MGD WITHDRAWAL FROM CENTER HILL PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	6019	2096	6019	4586	1155	4586	----	----	----	----
2001	6019	2096	6019	4586	1155	4586	0.9357	5632	4291	9923
2002	6019	2096	6019	4586	1155	4586	0.8755	5270	4015	9285
2003	6019	2096	6019	4586	1155	4586	0.8192	4931	3757	8687
2004	6019	2096	6019	4586	1155	4586	0.7665	4613	3515	8128
2005	6019	2096	6019	4586	1155	4586	0.7172	4317	3289	7606
2006	6019	2096	6019	4586	1155	4586	0.6710	4039	3077	7116
2007	6019	2096	6019	4586	1155	4586	0.6279	3779	2879	6659
2008	6019	2096	6019	4586	1155	4586	0.5875	3536	2694	6230
2009	6019	2096	6019	4586	1155	4586	0.5497	3309	2521	5829
2010	6019	2096	6019	4586	1155	4586	0.5143	3096	2359	5454
2011	6019	2096	6019	4586	1155	4586	0.4812	2897	2207	5104
2012	6019	2096	6019	4586	1155	4586	0.4503	2710	2065	4775
2013	6019	2096	6019	4586	1155	4586	0.4213	2536	1932	4468
2014	6019	2096	6019	4586	1155	4586	0.3942	2373	1808	4181
2015	6019	2096	6019	4586	1155	4586	0.3689	2220	1692	3912
2016	6019	2096	6019	4586	1155	4586	0.3451	2077	1583	3660
2017	---	2096	2096	---	1155	1155	0.3229	677	373	1050
2018	---	2096	2096	---	1155	1155	0.3022	633	349	982
2019	---	2096	2096	---	1155	1155	0.2827	592	326	919
2020	---	2096	2096	---	1155	1155	0.2645	554	305	860
2021	---	2096	2096	---	1155	1155	0.2475	519	286	804
2022	---	2096	2096	---	1155	1155	0.2316	485	267	753
2023	---	2096	2096	---	1155	1155	0.2167	454	250	704
2024	---	2096	2096	---	1155	1155	0.2028	425	234	659
2025-2043	---	2096	2096	---	1155	1155	2.1154	4433	2442	6875
2044	---	2096	2096	---	1155	1155	0.0536	112	62	174
2045	---	2096	2096	---	1155	1155	0.0502	105	58	163
2046	---	2096	2096	---	1155	1155	0.0470	98	54	153
2047	---	2096	2096	---	1155	1155	0.0439	92	51	143
2048	---	2096	2096	---	1155	1155	0.0411	86	47	134
2049	---	2096	2096	---	1155	1155	0.0385	81	44	125
2050	---	2096	2096	---	1155	1155	0.0360	75	42	117
2051	---	2096	2096	---	1155	1155	0.0337	71	39	109
										66827
										48914
										115741
Years of Analysis										51
Annualization Factor										0.07115
Annualized Capacity Credit (2000)										3480
Annualized Capacity Credit (2005)										8234
Annualized Capacity Credit (2010)										8698
Annualized Capacity Credit (2015)										9911
Annualized Capacity Credit (2020)										10777

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

TABLE 7-8b
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 10.0 MGD WITHDRAWAL FROM CENTER HILL PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	60124	20932	60124	45911	11548	45911	----	----	----	----
2001	60124	20932	60124	45911	11548	45911	0.9357	56256	42958	99214
2002	60124	20932	60124	45911	11548	45911	0.8755	52637	40194	92832
2003	60124	20932	60124	45911	11548	45911	0.8192	49251	37609	86860
2004	60124	20932	60124	45911	11548	45911	0.7665	46083	35189	81273
2005	60124	20932	60124	45911	11548	45911	0.7172	43119	32926	76045
2006	60124	20932	60124	45911	11548	45911	0.6710	40345	30808	71153
2007	60124	20932	60124	45911	11548	45911	0.6279	37750	28826	66576
2008	60124	20932	60124	45911	11548	45911	0.5875	35321	26972	62293
2009	60124	20932	60124	45911	11548	45911	0.5497	33049	25237	58286
2010	60124	20932	60124	45911	11548	45911	0.5143	30923	23613	54537
2011	60124	20932	60124	45911	11548	45911	0.4812	28934	22094	51028
2012	60124	20932	60124	45911	11548	45911	0.4503	27073	20673	47746
2013	60124	20932	60124	45911	11548	45911	0.4213	25331	19343	44674
2014	60124	20932	60124	45911	11548	45911	0.3942	23702	18099	41801
2015	60124	20932	60124	45911	11548	45911	0.3689	22177	16935	39112
2016	60124	20932	60124	45911	11548	45911	0.3451	20751	15845	36596
2017	---	20932	20932	----	11548	11548	0.3229	6760	3729	10489
2018	---	20932	20932	----	11548	11548	0.3022	6325	3489	9814
2019	---	20932	20932	----	11548	11548	0.2827	5918	3265	9183
2020	---	20932	20932	----	11548	11548	0.2645	5537	3055	8592
2021	---	20932	20932	----	11548	11548	0.2475	5181	2858	8039
2022	---	20932	20932	----	11548	11548	0.2316	4848	2675	7522
2023	---	20932	20932	----	11548	11548	0.2167	4536	2502	7038
2024	---	20932	20932	----	11548	11548	0.2028	4244	2341	6586
2025-2043	---	20932	20932	----	11548	11548	2.1154	44280	24429	68709
2044	---	20932	20932	----	11548	11548	0.0536	1123	619	1742
2045	---	20932	20932	----	11548	11548	0.0502	1050	580	1630
2046	---	20932	20932	----	11548	11548	0.0470	983	542	1525
2047	---	20932	20932	----	11548	11548	0.0439	920	507	1427
2048	---	20932	20932	----	11548	11548	0.0411	861	475	1335
2049	---	20932	20932	----	11548	11548	0.0385	805	444	1249
2050	---	20932	20932	----	11548	11548	0.0360	753	416	1169
2051	---	20932	20932	----	11548	11548	0.0337	705	389	1094
								667531	489637	1157167
Years of Analysis								51	51	51
Annualization Factor								0.07115	0.07115	0.07115
Annualized Capacity Credit (2000)								47492	34836	82328
Annualized Capacity Credit (2005)								47492	39483	86975
Annualized Capacity Credit (2010)								47492	51619	99111
Annualized Capacity Credit (2015)								47492	60233	107725

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are

COLUMN (9): Column (4) X Column (8).

based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (10): Column (7) X Column (8).

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (11): Column (9) + Column (10).

TABLE 7-9a
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 1.0 MGD WITHDRAWAL FROM J. PERCY PRIEST PROJECT

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077.

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) ± Column (10).

TABLE 7-9b
SEPA CAPACITY AND ENERGY CREDIT CALCULATIONS
FOR A 10.0 MGD WITHDRAWAL FROM J. PERCY PRIEST PROJECT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year	Capacity Benefit (\$)	Capacity Revenue (\$)	Annual Capacity Credit (\$)	Energy Benefit (\$)	Energy Revenue (\$)	Annual Energy Credit (\$)	Present-Worth Factor	Present-Worthed Capacity Credit (\$)	Present-Worthed Energy Credit (\$)	Total Power Credit (\$)
2000	70678	24606	70678	23327	6375	23327	----	----	----	----
2001	70678	24606	70678	23327	6375	23327	0.9357	66131	21826	87958
2002	70678	24606	70678	23327	6375	23327	0.8755	61877	20422	82300
2003	70678	24606	70678	23327	6375	23327	0.8192	57897	19109	77006
2004	70678	24606	70678	23327	6375	23327	0.7665	54173	17879	72052
2005	70678	24606	70678	23327	6375	23327	0.7172	50688	16729	67417
2006	70678	24606	70678	23327	6375	23327	0.6710	47427	15653	63080
2007	70678	24606	70678	23327	6375	23327	0.6279	44376	14646	59022
2008	70678	24606	70678	23327	6375	23327	0.5875	41522	13704	55226
2009	70678	24606	70678	23327	6375	23327	0.5497	38851	12823	51673
2010	70678	24606	70678	23327	6375	23327	0.5143	36351	11998	48349
2011	70678	24606	70678	23327	6375	23327	0.4812	34013	11226	45239
2012	70678	24606	70678	23327	6375	23327	0.4503	31825	10504	42329
2013	70678	24606	70678	23327	6375	23327	0.4213	29778	9828	39606
2014	70678	24606	70678	23327	6375	23327	0.3942	27862	9196	37058
2015	70678	24606	70678	23327	6375	23327	0.3689	26070	8604	34674
2016	70678	24606	70678	23327	6375	23327	0.3451	24393	8051	32444
2017	---	24606	24606	----	6375	6375	0.3229	7946	2059	10005
2018	---	24606	24606	----	6375	6375	0.3022	7435	1926	9361
2019	---	24606	24606	----	6375	6375	0.2827	6957	1802	8759
2020	---	24606	24606	----	6375	6375	0.2645	6509	1686	8196
2021	---	24606	24606	----	6375	6375	0.2475	6090	1578	7668
2022	---	24606	24606	----	6375	6375	0.2316	5699	1476	7175
2023	---	24606	24606	----	6375	6375	0.2167	5332	1381	6713
2024	---	24606	24606	----	6375	6375	0.2028	4989	1293	6282
2025-2062	---	24606	24606	----	6375	6375	2.7134	66767	17298	84065
2063	---	24606	24606	----	6375	6375	0.0152	373	97	470
2064	---	24606	24606	----	6375	6375	0.0142	349	90	440
2065	---	24606	24606	----	6375	6375	0.0133	327	85	411
2066	---	24606	24606	----	6375	6375	0.0124	306	79	385
2067	---	24606	24606	----	6375	6375	0.0116	286	74	360
2068	---	24606	24606	----	6375	6375	0.0109	268	69	337
2069	---	24606	24606	----	6375	6375	0.0102	250	65	315
2070	---	24606	24606	----	6375	6375	0.0095	234	61	295

Years of Analysis										
Annualization Factor										
Annualized Capacity Credit (2000)										
Annualized Capacity Credit (2005)										
Annualized Capacity Credit (2010)										
Annualized Capacity Credit (2015)										

COLUMN EXPLANATIONS:

COLUMN (1): The end of the Laurel project's economic life is the year 2077

COLUMN (2): The capacity benefit is from Table 5-1.

COLUMN (3): The capacity revenue is from Table 6-1.

COLUMN (4): The power from this project is marketed under a contract that will expire in 2016. Capacity credits are based upon capacity benefits until 2016, and capacity revenues foregone from 2016 to the end of project economic life.

COLUMN (5): The energy benefit is from Table 5-1.

COLUMN (6): The energy revenue is from Table 6-1.

COLUMN (7): The energy credits are calculated as described in Column (4).

COLUMN (8): Amortization factor at 6-7/8% interest.

COLUMN (9): Column (4) X Column (8).

COLUMN (10): Column (7) X Column (8).

COLUMN (11): Column (9) + Column (10).

SUMMARY OF CREDIT TO SEPA

Proposed Withdrawals for 2000

<u>Project</u>	<u>Proposed Withdrawal (MGD)</u>	<u>SEPA Capacity Credit</u>	<u>SEPA Energy Credit</u>	<u>SEPA Total Credit</u>
Laurel	1.0	\$13,260	\$6,245	\$19,505
Wolf Creek	1.0	\$2,548	\$3,406	\$5,954
Cordell Hull	1.0	\$787	\$1,081	\$1,868
Old Hickory	1.0	\$629	\$1,076	\$1,705
Cheatham	1.0	\$264	\$449	\$713
Barkley	1.0	\$342	\$861	\$1,203
Dale Hollow	1.0	\$3,345	\$2,940	\$6,285
Center Hill	1.0	\$4,754	\$3,480	\$8,234
J. Percy Priest	1.0	\$5,814	\$1,758	\$7,572

CREDIT TO SEPA

Proposed Withdrawals for 2000

<u>Project</u>	<u>Proposed Withdrawal (MGD)</u>	<u>SEPA Capacity Credit</u>	<u>SEPA Energy Credit</u>	<u>SEPA Total Credit</u>
Laurel	10.0	\$149,624	\$63,094	\$212,718
Wolf Creek	10.0	\$25,457	\$34,061	\$59,518
Cordell Hull	10.0	\$7,864	\$10,796	\$18,660
Old Hickory	10.0	\$6,284	\$10,753	\$17,037
Cheatham	10.0	\$2,641	\$4,486	\$7,127
Barkley	10.0	\$3,422	\$8,610	\$12,032
Dale Hollow	10.0	\$33,419	\$29,226	\$62,645
Center Hill	10.0	\$47,492	\$34,836	\$82,328
J. Percy Priest	10.0	\$55,067	\$17,583	\$72,650

CHAPTER 8: SUMMARY OF RESULTS

8.01 POWER BENEFITS FOREGONE

Summarizing the data developed in Chapters 2 through 5, the power benefits foregone for the projects are as follows (from Tables 5-1 and 5-2):

<u>2000</u>	With-drawal (MGD)	Capacity Benefits Foregone	Energy Benefits Foregone	Total Benefits Foregone
Laurel	1.0	\$17,052	\$8,484	\$25,536
Wolf Creek	1.0	\$3,230	\$4,488	\$7,718
Cordell Hull	1.0	\$1,012	\$1,445	\$2,457
Old Hickory	1.0	\$802	\$1,418	\$2,220
Cheatham	1.0	\$337	\$591	\$928
Barkley	1.0	\$439	\$1,140	\$1,579
Dale Hollow	1.0	\$4,223	\$3,869	\$8,092
Center Hill	1.0	\$6,019	\$4,586	\$10,605
J. Percy Priest	1.0	\$7,462	\$2,333	\$9,795

<u>2005</u>	With-drawal (MGD)	Capacity Benefits Foregone	Energy Benefits Foregone	Total Benefits Foregone
Laurel	1.0	\$17,052	\$9,628	\$26,680
Wolf Creek	1.0	\$3,230	\$5,138	\$8,368
Cordell Hull	1.0	\$1,012	\$1,655	\$2,667
Old Hickory	1.0	\$802	\$1,595	\$2,397
Cheatham	1.0	\$337	\$671	\$1,008
Barkley	1.0	\$439	\$1,277	\$1,716
Dale Hollow	1.0	\$4,223	\$4,450	\$8,673
Center Hill	1.0	\$6,019	\$5,270	\$11,289
J. Percy Priest	1.0	\$7,462	\$2,613	\$10,075

<u>2010</u>	With-drawal (MGD)	Capacity Benefits Foregone	Energy Benefits Foregone	Total Benefits Foregone
Laurel	1.0	\$17,052	\$13,806	\$30,858
Wolf Creek	1.0	\$3,230	\$7,010	\$10,240
Cordell Hull	1.0	\$1,012	\$2,247	\$3,259
Old Hickory	1.0	\$802	\$2,141	\$2,943
Cheatham	1.0	\$337	\$877	\$1,214
Barkley	1.0	\$439	\$1,685	\$2,124
Dale Hollow	1.0	\$4,223	\$6,183	\$10,406
Center Hill	1.0	\$6,019	\$7,061	\$13,080
J. Percy Priest	1.0	\$7,462	\$3,448	\$10,910

	With- drawal (MGD)	Capacity Benefits Foregone	Energy Benefits Foregone	Total Benefits Foregone
2015				
Laurel	1.0	\$17,052	\$15,885	\$32,937
Wolf Creek	1.0	\$3,230	\$8,227	\$11,457
Cordell Hull	1.0	\$1,012	\$2,619	\$3,631
Old Hickory	1.0	\$802	\$1,484	\$2,286
Cheatham	1.0	\$337	\$963	\$1,300
Barkley	1.0	\$439	\$1,941	\$2,380
Dale Hollow	1.0	\$4,223	\$6,985	\$11,208
Center Hill	1.0	\$6,019	\$8,338	\$14,357
J. Percy Priest	1.0	\$7,462	\$3,971	\$11,433

	With- drawal (MGD)	Capacity Benefits Foregone	Energy Benefits Foregone	Total Benefits Foregone
2000				
Laurel	10.0	\$192,420	\$85,820	\$278,240
Wolf Creek	10.0	\$32,268	\$44,876	\$77,144
Cordell Hull	10.0	\$10,105	\$14,434	\$24,539
Old Hickory	10.0	\$8,006	\$14,176	\$22,182
Cheatham	10.0	\$3,368	\$5,907	\$9,275
Barkley	10.0	\$4,384	\$11,401	\$15,785
Dale Hollow	10.0	\$42,190	\$38,436	\$80,626
Center Hill	10.0	\$60,124	\$45,911	\$106,035
J. Percy Priest	10.0	\$74,542	\$23,327	\$94,005

	With- drawal (MGD)	Capacity Benefits Foregone	Energy Benefits Foregone	Total Benefits Foregone
2005				
Laurel	10.0	\$192,420	\$97,374	\$289,794
Wolf Creek	10.0	\$32,268	\$51,395	\$83,663
Cordell Hull	10.0	\$10,105	\$16,584	\$26,689
Old Hickory	10.0	\$8,006	\$15,952	\$23,958
Cheatham	10.0	\$3,368	\$6,692	\$10,060
Barkley	10.0	\$4,384	\$12,772	\$17,156
Dale Hollow	10.0	\$42,190	\$44,167	\$86,357
Center Hill	10.0	\$60,124	\$52,768	\$112,892
J. Percy Priest	10.0	\$74,542	\$26,132	\$96,810

<u>2010</u>	With-drawal (MGD)	Capacity Benefits <u>Foregone</u>	Energy Benefits <u>Foregone</u>	Total Benefits <u>Foregone</u>
Laurel	10.0	\$192,420	\$138,525	\$330,945
Wolf Creek	10.0	\$32,268	\$70,239	\$102,507
Cordell Hull	10.0	\$10,105	\$22,353	\$32,458
Old Hickory	10.0	\$8,006	\$21,424	\$29,430
Cheatham	10.0	\$3,368	\$8,702	\$12,070
Barkley	10.0	\$4,384	\$16,862	\$21,246
Dale Hollow	10.0	\$42,190	\$61,514	\$103,704
Center Hill	10.0	\$60,124	\$70,677	\$130,801
J. Percy Priest	10.0	\$74,542	\$34,501	\$105,179

<u>2015</u>	With-drawal (MGD)	Capacity Benefits <u>Foregone</u>	Energy Benefits <u>Foregone</u>	Total Benefits <u>Foregone</u>
Laurel	10.0	\$192,420	\$160,659	\$353,079
Wolf Creek	10.0	\$32,268	\$82,589	\$114,857
Cordell Hull	10.0	\$10,105	\$26,138	\$36,243
Old Hickory	10.0	\$8,006	\$24,847	\$32,853
Cheatham	10.0	\$3,368	\$9,638	\$13,006
Barkley	10.0	\$4,384	\$19,422	\$23,806
Dale Hollow	10.0	\$42,190	\$69,304	\$111,494
Center Hill	10.0	\$60,124	\$83,387	\$143,511
J. Percy Priest	10.0	\$74,542	\$39,739	\$110,417

8.02 REVENUES FOREGONE

Summarizing the data developed in Chapter 6, the power revenues foregone for the projects are as follows (from Tables 6-1 through 6-2):

	With- drawal (MGD)	Capacity Revenues Foregone	Energy Revenues Foregone	Total Revenues Foregone
Laurel	1.0	\$5,937	\$1,921	\$7,858
Wolf Creek	1.0	\$1,125	\$1,148	\$2,272
Cordell Hull	1.0	\$352	\$374	\$726
Old Hickory	1.0	\$279	\$380	\$659
Cheatham	1.0	\$117	\$161	\$279
Barkley	1.0	\$153	\$312	\$464
Dale Hollow	1.0	\$1,470	\$956	\$2,426
Center Hill	1.0	\$2,096	\$1,155	\$3,250
J. Percy Priest	1.0	\$2,598	\$637	\$3,235

	With- drawal (MGD)	Capacity Revenues Foregone	Energy Revenues Foregone	Total Revenues Foregone
Laurel	10.0	\$66,990	\$19,213	\$86,203
Wolf Creek	10.0	\$11,234	\$11,478	\$22,712
Cordell Hull	10.0	\$3,518	\$3,743	\$7,261
Old Hickory	10.0	\$2,787	\$3,803	\$6,591
Cheatham	10.0	\$1,173	\$1,614	\$2,786
Barkley	10.0	\$1,526	\$3,116	\$4,642
Dale Hollow	10.0	\$14,688	\$9,559	\$24,248
Center Hill	10.0	\$20,932	\$11,548	\$32,480
J. Percy Priest	10.0	\$25,951	\$6,375	\$30,981

8.03 REPLACEMENT COST

As noted in Section 1.07, the replacement cost of power as used in determining the cost of the reallocation to the water supply customer is identical in each case to the benefits foregone presented in Section 8.01.

8.04 SEPA CREDIT

Summarizing the data developed in Chapter 7, the SEPA credits for the projects are as follows:

<u>2000</u>	Proposed Withdrawal <u>(MGD)</u>	SEPA Capacity <u>Credit</u>	SEPA Energy <u>Credit</u>	SEPA Total <u>Credit</u>
Laurel	1.0	\$13,260	\$6,245	\$19,505
Wolf Creek	1.0	\$2,548	\$3,406	\$5,954
Cordell Hull	1.0	\$787	\$1,081	\$1,868
Old Hickory	1.0	\$629	\$1,076	\$1,705
Cheatham	1.0	\$264	\$449	\$713
Barkley	1.0	\$342	\$861	\$1,203
Dale Hollow	1.0	\$3,345	\$2,940	\$6,285
Center Hill	1.0	\$4,754	\$3,480	\$8,234
J. Percy Priest	1.0	\$5,814	\$1,758	\$7,572

<u>2005</u>	Proposed Withdrawal <u>(MGD)</u>	SEPA Capacity <u>Credit</u>	SEPA Energy <u>Credit</u>	SEPA Total <u>Credit</u>
Laurel	1.0	\$13,260	\$6,998	\$20,258
Wolf Creek	1.0	\$2,548	\$3,846	\$6,394
Cordell Hull	1.0	\$787	\$1,219	\$2,006
Old Hickory	1.0	\$629	\$1,194	\$1,823
Cheatham	1.0	\$264	\$502	\$766
Barkley	1.0	\$342	\$952	\$1,294
Dale Hollow	1.0	\$3,345	\$3,336	\$6,681
Center Hill	1.0	\$4,754	\$3,944	\$8,698
J. Percy Priest	1.0	\$5,814	\$1,944	\$7,758

<u>2010</u>	Proposed Withdrawal <u>(MGD)</u>	SEPA Capacity <u>Credit</u>	SEPA Energy <u>Credit</u>	SEPA Total <u>Credit</u>
Laurel	1.0	\$13,260	\$9,751	\$23,011
Wolf Creek	1.0	\$2,548	\$5,112	\$7,660
Cordell Hull	1.0	\$787	\$1,610	\$2,397
Old Hickory	1.0	\$629	\$1,560	\$2,189
Cheatham	1.0	\$264	\$640	\$904
Barkley	1.0	\$342	\$1,222	\$1,564
Dale Hollow	1.0	\$3,345	\$4,516	\$7,861
Center Hill	1.0	\$4,754	\$5,157	\$9,911
J. Percy Priest	1.0	\$5,814	\$2,496	\$8,310

<u>2015</u>	Proposed Withdrawal (MGD)	SEPA Capacity <u>Credit</u>	SEPA Energy <u>Credit</u>	SEPA Total <u>Credit</u>
Laurel	1.0	\$13,260	\$11,121	\$24,381
Wolf Creek	1.0	\$2,548	\$5,935	\$8,483
Cordell Hull	1.0	\$787	\$1,855	\$2,642
Old Hickory	1.0	\$629	\$1,120	\$1,749
Cheatham	1.0	\$264	\$698	\$962
Barkley	1.0	\$342	\$1,392	\$1,734
Dale Hollow	1.0	\$3,345	\$5,062	\$8,407
Center Hill	1.0	\$4,754	\$6,023	\$10,777
J. Percy Priest	1.0	\$5,814	\$2,841	\$8,655

<u>2000</u>	With- drawal (MGD)	SEPA Capacity <u>Credit</u>	SEPA Energy <u>Credit</u>	SEPA Total <u>Credit</u>
Laurel	10.0	\$149,624	\$63,094	\$212,718
Wolf Creek	10.0	\$25,457	\$34,061	\$59,518
Cordell Hull	10.0	\$7,864	\$10,796	\$18,660
Old Hickory	10.0	\$6,284	\$10,753	\$17,037
Cheatham	10.0	\$2,641	\$4,486	\$7,127
Barkley	10.0	\$3,422	\$8,610	\$12,032
Dale Hollow	10.0	\$33,419	\$29,226	\$62,645
Center Hill	10.0	\$47,492	\$34,836	\$82,328
J. Percy Priest	10.0	\$55,067	\$17,583	\$72,650

<u>2005</u>	With- drawal (MGD)	SEPA Capacity <u>Credit</u>	SEPA Energy <u>Credit</u>	SEPA Total <u>Credit</u>
Laurel	10.0	\$149,624	\$70,706	\$220,330
Wolf Creek	10.0	\$25,457	\$38,469	\$63,926
Cordell Hull	10.0	\$7,864	\$12,214	\$20,078
Old Hickory	10.0	\$6,284	\$11,943	\$18,227
Cheatham	10.0	\$2,641	\$5,011	\$7,652
Barkley	10.0	\$3,422	\$9,519	\$12,941
Dale Hollow	10.0	\$33,419	\$33,129	\$66,548
Center Hill	10.0	\$47,492	\$39,483	\$86,975
J. Percy Priest	10.0	\$55,067	\$19,438	\$74,505

<u>2010</u>	With-drawal (MGD)	SEPA Capacity <u>Credit</u>	SEPA Energy <u>Credit</u>	SEPA Total <u>Credit</u>
Laurel	10.0	\$149,624	\$97,817	\$247,441
Wolf Creek	10.0	\$25,457	\$51,211	\$76,668
Cordell Hull	10.0	\$7,864	\$16,020	\$23,884
Old Hickory	10.0	\$6,284	\$15,609	\$21,893
Cheatham	10.0	\$2,641	\$6,356	\$8,997
Barkley	10.0	\$3,422	\$12,231	\$15,653
Dale Hollow	10.0	\$33,419	\$44,944	\$78,363
Center Hill	10.0	\$47,492	\$51,619	\$99,111
J. Percy Priest	10.0	\$55,067	\$24,971	\$80,038

<u>2015</u>	With-drawal (MGD)	SEPA Capacity <u>Credit</u>	SEPA Energy <u>Credit</u>	SEPA Total <u>Credit</u>
Laurel	10.0	\$149,624	\$112,399	\$262,023
Wolf Creek	10.0	\$25,457	\$59,562	\$85,019
Cordell Hull	10.0	\$7,864	\$18,517	\$26,381
Old Hickory	10.0	\$6,284	\$17,903	\$24,187
Cheatham	10.0	\$2,641	\$6,982	\$9,623
Barkley	10.0	\$3,422	\$13,929	\$17,351
Dale Hollow	10.0	\$33,419	\$50,249	\$83,668
Center Hill	10.0	\$47,492	\$60,233	\$107,725
J. Percy Priest	10.0	\$55,067	\$28,434	\$83,501

8.05 SUMMARY

Based on this analysis, the benefits foregone appear to be higher than the revenues foregone. This would imply that these would be the basis of the cost for the reallocation, unless the updated cost of the storage is higher. This value of the updated cost of storage will be computed through other analysis by the Nashville District and is not included in this report.

APPENDIX A : FERC

A.1 CAPACITY VALUE

COAL-FIRED STEAM POWER VALUE

Date Run
08/06/99

PROJECT NAME: CUMBERLAND BASIN PROJECTS
LOCATION: TENNESSEE
FINANCING: FEDERAL @ 6.875

Capacity Value \$210.50 per kW-yr
Energy Value \$ 14.21 per kW-yr

PROGRAM INPUT DATA				
			State Index Number	43
Cost Level Date	10/01/98		State Location	TN
Single unit capacity	600		H-W Index Reg No	2
Capacity factor	0.65		ROW (\$/acre)	2284
Trans Voltage	345		Clearing % of ROW	0.60
Transformer MVA	200		Rec Sub Land Cost	21486
No of Trans	6		Plant Invest	1309
No of Trans Pos	2		FC Mov-Ave Time Frame	12
Single or Three Phase	1		Fuel Cost	112.4
Length Line 1	50		Heat Rate	9830
Length Line 2	0		O&M update	2.33
Line 1: Total Circuits	3		Plant update	2.19
No of Single Circ	1		Transmission update	2.09
No of Double Circ	1		Depreciation Plant (%)	1.08
Line 2: Total Circuits	0		Deprec Sub (%)	1.08
No of Single Circ	0		Deprec Trans Tower (%)	0.26
No of Double Circ	0		Deprec Trans Pole (%)	1.08
Cost of Money (%)	6.875			
Plant Life	30		Fed Inc Tax (%)	0.000
Substation Life	30		Fed Misc Tax (%)	0.000
Trans (towers) Life	50		State & Local Tax (%)	0.000
Trans (poles) life	30			
			Hydro Flex Adjust	0.050
Plant insurance (%)	0.25		Alt Mechanical Avail	0.850
Trans Insurance (%)	0.10		Hydro Mech Avail	0.980
Sub insurance (%)	0.25		Mech Avail Adjust	0.153

A.2 CAPACITY VALUE

COMBINED CYCLE POWER VALUE

Date Run
08/06/99

PROJECT NAME: CUMBERLAND BASIN PROJECTS
LOCATION: TENNESSEE
FINANCING: FEDERAL @ 6.875

Capacity Value \$107.07 per kW-yr
Energy Value \$ 21.01 per kW-yr

PROGRAM INPUT DATA			
		State Index Number	43
Cost Level Date	10/01/98	State Location	TN
Single unit capacity	150	H-W Index Reg No	2
Capacity factor	0.30	ROW (\$/acre)	2284
Trans Voltage	230	Clearing % of ROW	0.60
Transformer MVA	200	Rec Sub Land Cost	21486
No of Trans	2	Plant Invest	644
No of Trans Pos	2	FC Mov-Ave Time Frame	12
Single or Three Phase	3	Fuel Cost	250.4
Length Line 1	0	Heat Rate	8030
Length Line 2	0	O&M update	2.33
Line 1: Total Circuits	2	Plant update	2.19
No of Single Circ	2	Transmission update	2.09
No of Double Circ	0	Depreciation Plant (%)	1.08
Line 2: Total Circuits	0	Deprec Sub (%)	1.08
No of Single Circ	0	Deprec Trans Tower (%)	0.26
No of Double Circ	0	Deprec Trans Pole (%)	1.08
Cost of Money (%)	6.875		
Plant Life	30	Fed Inc Tax (%)	0.000
Substation Life	30	Fed Misc Tax (%)	0.000
Trans (towers) Life	50	State & Local Tax (%)	0.000
Trans (poles) life	30		
		Hydro Flex Adjust	0.025
Plant insurance (%)	0.25	Alt Mechanical Avail	0.900
Trans Insurance (%)	0.10	Hydro Mech Avail	0.980
Sub insurance (%)	0.25	Mech Avail Adjust	0.089

A.3 CAPACITY VALUE

COMBUSTION TURBINE POWER VALUE

Date Run
08/06/99

PROJECT NAME: CUMBERLAND BASIN PROJECTS
LOCATION: TENNESSEE
FINANCING: FEDERAL @ 6.875

Capacity Value \$ 60.27 per kW-yr
Energy Value \$ 32.45 per kW-yr

PROGRAM INPUT DATA				
			State Index Number	43
Cost Level Date	10/01/98		State Location	TN
Single unit capacity	100	H-W Index Reg No		2
Capacity factor	0.10	ROW (\$/acre)		2284
Trans Voltage	230	Clearing % of ROW		0.60
Transformer MVA	125	Rec Sub Land Cost		21486
No of Trans	2	Plant Invest		428
No of Trans Pos	2	FC Mov-Ave Time Frame		12
Single or Three Phase	3	Fuel Cost		250.4
Length Line 1	0	Heat Rate		12870
Length Line 2	0	O&M update		2.33
Line 1: Total Circuits	2	Plant update		2.19
No of Single Circ	2	Transmission update		2.09
No of Double Circ	0	Depreciation Plant (%)		1.08
Line 2: Total Circuits	0	Deprec Sub (%)		1.08
No of Single Circ	0	Deprec Trans Tower (%)		0.26
No of Double Circ	0	Deprec Trans Pole (%)		1.08
Cost of Money (%)	6.875			
Plant Life	30	Fed Inc Tax (%)		0.000
Substation Life	30	Fed Misc Tax (%)		0.000
Trans (towers) Life	50	State & Local Tax (%)		0.000
Trans (poles) life	30			
		Hydro Flex Adjust		0.025
Plant insurance (%)	0.25	Alt Mechanical Avail		0.900
Trans Insurance (%)	0.10	Hydro Mech Avail		0.980
Sub insurance (%)	0.25	Mech Avail Adjust		0.089